

Air Quality Analysis Supporting Documentation

The Proposed Action is to recapitalize the T-38C Talon flight training program at Vance Air Force Base (AFB), Oklahoma, with T-7A Red Hawk aircraft. The Department of the Air Force (DAF) is considering three alternative ways to implement the Proposed Action (i.e., Alternatives 1, 2, and 3), and the No Action Alternative. Recapitalization would include introduction of T-7A aircraft at and removal of T-38C aircraft from at Vance AFB; flight operations at Vance AFB and within Vance 1A, Vance 1C, and Vance 1E Military Operating Areas (MOAs), and Military Training Routes (MTRs) IR-145, IR-171, IR-175, IR-181, and IR-185; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction for four military construction (MILCON) and unspecified minor military construction (UMMC) projects and eight facilities sustainment, restoration, and modernization (FSRM) projects at Vance AFB.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 also would result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A and T-38C operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than those for Alternative 1. Alternative 3 also includes construction of additional aircraft shelters for the additional T-7A aircraft. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The Air Conformity Applicability Model (ACAM) versions 5.0.23a and 5.0.24a were used to perform an analysis to assess the potential air quality impacts associated with the Proposed Action and alternatives. This document provides the ACAM results.

The two regions of influence (ROIs) for this air quality assessment are the Vance AFB ROI, within which all Vance AFB airfield operations (i.e., takeoffs, landings, and closed patterns) and construction actions would occur, and the SUA ROI, which contains the Vance MOAs and MTRs within which T-7A SUA operations would occur.

The mixing zone is a three-dimensional vertical column of air generally up to 3,000 feet above ground level (AGL) where criteria pollutant emissions, due to atmospheric mixing and dispersion, have the greatest potential to directly impact human health and air quality. As such, criteria pollutant emissions are evaluated within and up to 3,000 feet. For the Proposed Action, no aircraft operations below 3,000 feet AGL occur within Vance 1A and Vance 1C MOAs; therefore, these areas were not considered for criteria pollutant emissions.

Greenhouse gases (GHGs) are gas emissions that trap heat in the atmosphere and include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), tropospheric ozone, and several fluorinated and chlorinated gaseous compounds. CO₂, CH₄, and N₂O account for

99.6 percent of all direct GHG emissions in the U.S.¹ GHGs at any altitude, including those above the mixing zone, can contribute to a warming effect within the atmosphere. As such, GHG emissions are evaluated at all altitudes.

This document is presented in two sections corresponding to two separate air quality ROIs based on regulatory requirements and the physical spatial distribution of the emissions sources associated with the Proposed Action and alternatives. The two ROIs are as follows:

- **Vance AFB ROI** – includes all Vance AFB airfield operations, personnel changes, construction actions, and facility operations.

Counties included:

Garfield County, OK

- **SUA ROI** – includes aircraft operations within Vance 1A, Vance 1C, and Vance 1E MOAs; and IR-145, IR-171, IR-175, IR-181, and IR-185.

Counties included:

Alfalfa County, OK

Roger Mills County, OK

Beaver County, OK

Woods County, OK

Blaine County, OK

Woodward County, OK

Custer County, OK

Barber County, KS

Dewey County, OK

Clark County, KS

Ellis County, OK

Comanche County, KS

Garfield County, OK

Harper County, KS

Harper County, OK

Hemphill County, TX

Kingfisher County, OK

Lipscomb County, TX

Major County, OK

¹ USEPA. 2024. Greenhouse Gas Reporting Program (GHGRP) Emissions by GHG. October 15, 2024. Available online: <<https://www.epa.gov/ghgreporting/ghgrp-emissions-ghg>>. Accessed January 3, 2025.

Table 1 outlines the attainment status for the counties within the Vance AFB and SUA ROIs.

Table 1. National Ambient Air Quality Standards Attainment Status for All Counties within the Vance AFB and SUA ROIs

County	Airspace	Attainment Status	<i>de minimis</i> Threshold
Alfalfa County, OK	Vance 1A, Vance 1E, IR-171, IR-175, IR-181, IR-185	Unclassifiable/Attainment	None
Beaver County, OK	IR-175, IR-185	Unclassifiable/Attainment	None
Blaine County, OK	Vance 1A, IR-145, IR-171, IR-181	Unclassifiable/Attainment	None
Custer County, OK	IR-145, IR-171, IR-181	Unclassifiable/Attainment	None
Dewey County, OK	Vance 1A, Vance 1C, IR-145, IR-171, IR-181	Unclassifiable/Attainment	None
Ellis County, OK	Vance 1C, IR-145, IR-171, IR-175, IR-181, IR-185	Unclassifiable/Attainment	None
Garfield County, OK	Vance AFB, Vance 1A	Unclassifiable/Attainment	None
Harper County, OK	Vance 1C, IR-175, IR-185	Unclassifiable/Attainment	None
Kingfisher County, OK	Vance 1A, IR-145	Unclassifiable/Attainment	None
Major County, OK	Vance 1A, Vance 1C, IR-145, IR-171, IR-175, IR-181, IR-185	Unclassifiable/Attainment	None
Roger Mills County, OK	Vance 1C, IR-145, IR-171, IR-181	Unclassifiable/Attainment	None
Woods County, OK	Vance 1A, Vance 1C, Vance 1E, IR-145, IR-171, IR-175, IR-181, IR-185	Unclassifiable/Attainment	None
Woodward County, OK	Vance 1C, IR-145, IR-171, IR-175, IR-181, IR-185	Unclassifiable/Attainment	None
Barber County, KS	Vance 1C, Vance 1E, IR-175, IR-185	Unclassifiable/Attainment	None
Clark County, KS	Vance 1C, IR-175, IR-185	Unclassifiable/Attainment	None
Comanche County, KS	Vance 1C, IR-175, IR-185	Unclassifiable/Attainment	None
Harper County, KS	Vance 1E	Unclassifiable/Attainment	None
Hemphill County, TX	IR-145, IR-171, IR-181	Unclassifiable/Attainment	None
Lipscomb County, TX	IR-145	Unclassifiable/Attainment	None

Sources: (1) 40 Code of Federal Regulations § 93.153; (2) U.S. Environmental Protection Agency. 2025. Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants, for Oklahoma, Kansas, and Texas. As of February 28, 2025. Available online: <https://www3.epa.gov/airquality/greenbook/anayo_ak.html>. Accessed March 10, 2025.

The emission factors presented in this report are embedded within ACAM and come from the following DAF documents: (1) *Air Emissions Guide for Air Force Stationary Sources, Methods for Estimating Emissions of Air Pollutants for Stationary Sources at U.S. Air Force Installations*, Air Force Civil Engineer Center (June 2020), and (2) *Air Emissions Guide for Air Force Mobile Sources, Methods for Estimating Emissions of Air Pollutants for Mobile Sources at U.S. Air Force Installations*, Air Force Civil Engineering Center (June 2020). Additional data and methodology used to prepare the ACAM reports are below.

Time in Mode (TIM) Summary for T-7A and T-38C Aircraft Within the ROIs²

Table 2. TIM Summary for Vance AFB ROI

	Idle In/Out (min)	Takeoff AB (min)	Takeoff Mil (min)	Climbout (min)	Approach (min)
Vance AFB T-7A TIM Summary					
LTO Flight	0.00	0.02	1.01	0.49	5.18
LTO Taxi	13.16	0.00	0.00	0.00	0.00
Total LTO	13.16	0.02	1.01	0.49	5.18
Closed Patterns	0.00	0.00	0.38	1.38	2.22
Vance AFB T-38C TIM Summary					
LTO Flight	0.00	0.43	0.60	0.49	5.18
LTO Taxi	14.56	0.00	0.00	0.00	0.00
Total LTO	14.56	0.43	0.60	0.49	5.18
Closed Patterns	0.00	0.00	0.39	1.42	2.27

Key: AB = afterburner; LTO = landing and takeoff cycle; mil = military; min = minutes

² The Vance AFB ROI air emission estimates for all three action alternatives were recalculated after the Draft EIS was released for public comment to correct an overestimation in the time-in-mode values. The overestimation was identified through DAF review rather than public comment provided on the Draft EIS and was corrected by removing duplicate T-7A and T 38C closed patterns that also were counted in the landing and takeoff cycles. The revised air emissions are provided in the Final EIS and, in general, are less than those in the Draft EIS.

Table 3. TIM Summary for SUA ROI

	Idle In/Out (min)	Takeoff AB (min)	Takeoff Mil (min)	Climbout (min)	Approach (min)
IR-145					
Total LFP	0.00	0.00	29.00	0.00	0.00
Total DC	0.00	0.00	29.00	0.00	0.00
IR-171					
Total LFP	0.00	0.00	26.00	0.00	0.00
Total DC	0.00	0.00	26.00	0.00	0.00
IR-175					
Total LFP	0.00	0.00	31.00	0.00	0.00
Total DC	0.00	0.00	31.00	0.00	0.00
IR-181					
Total LFP	0.00	0.00	26.00	0.00	0.00
Total DC	0.00	0.00	26.00	0.00	0.00
IR-185					
Total LFP	0.00	0.00	31.00	0.00	0.00
Total DC	0.00	0.00	31.00	0.00	0.00
Vance 1A MOA					
Total LFP	N/A	N/A	N/A	N/A	N/A
Total DC	0.00	0.00	8.40	3.60	3.00
Vance 1C MOA					
Total LFP	N/A	N/A	N/A	N/A	N/A
Total DC	0.00	0.00	3.04	31.92	3.04
Vance 1E MOA					
Total LFP	0.00	0.00	35.00	0.00	0.00
Total DC	0.00	0.00	35.00	0.00	0.00

Key: AB = afterburner; DC = destination cycle; LFP = low flight pattern; mil = military; min = minutes; N/A = not applicable

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators would be required, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

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Vance AFB ROI

Note: The Vance AFB ROI air emission estimates for all three action alternatives were recalculated after the Draft EIS was released for public comment to correct an overestimation in the time-in-mode values. The overestimation was identified through DAF review rather than public comment provided on the Draft EIS and was corrected by removing duplicate T-7A and T-38C closed patterns that also were counted in the landing and takeoff cycles. The revised air emissions are provided in the Final EIS and, in general, are less than those in the Draft EIS.

Vance AFB ROI: Alternative 1 ACAM Report

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: T-7A Recapitalization at Vance AFB - Alternative 1

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2028

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

f. Point of Contact:

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the GCR are:

_____ applicable
 X not applicable

Total reasonably foreseeable net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving “steady state” (cCba.e., no net gain/loss in emission stabilized and the action is fully implemented) emissions. The ACAM analysis uses the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the *USAF Air Emissions Guide for Air Force Stationary Sources*, the *USAF Air Emissions Guide for Air Force Mobile Sources*, and the *USAF Air Emissions Guide for Air Force Transitory Sources*.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of the proposed Action’s potential impacts to local air quality. The insignificance indicators are trivial (de minimis) rate thresholds that have been demonstrated to have little to no impact to air quality. These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold and 25 ton/yr for lead for actions occurring in areas that are "Attainment" (cCba.e., not exceeding any National Ambient Air Quality Standard (NAAQS)). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutants is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQS. For further detail on insignificance indicators, refer to *Level II, Air Quality Quantitative Assessment, Insignificance Indicators*.

The action’s net emissions for every year through achieving steady state were compared against the Insignificance Indicators and are summarized below.

Analysis Summary:

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.154	250	No
NOx	8.038	250	No
CO	12.364	250	No
SOx	0.019	250	No
PM 10	4.595	250	No
PM 2.5	0.234	250	No
Pb	0.000	25	No
NH3	0.026	250	No

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.406	250	No
NOx	3.306	250	No
CO	4.983	250	No
SOx	0.008	250	No
PM 10	0.103	250	No
PM 2.5	0.095	250	No
Pb	0.000	25	No
NH3	0.012	250	No

2030

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.001	250	No
NOx	0.014	250	No
CO	0.012	250	No
SOx	0.000	250	No
PM 10	0.001	250	No
PM 2.5	0.001	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.001	250	No
NOx	0.014	250	No
CO	0.012	250	No
SOx	0.000	250	No
PM 10	0.001	250	No
PM 2.5	0.001	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	17.696	250	No
NOx	47.423	250	No
CO	129.739	250	No
SOx	2.811	250	No
PM 10	2.620	250	No
PM 2.5	2.366	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2033

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	61.611	250	No
NOx	179.194	250	No
CO	118.024	250	No
SOx	8.502	250	No
PM 10	0.236	250	No
PM 2.5	0.198	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2034

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	57.536	250	No
NOx	194.710	250	No
CO	-126.866	250	No
SOx	6.795	250	No
PM 10	-5.824	250	No
PM 2.5	-5.297	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2035 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	57.400	250	No
NOx	194.668	250	No
CO	-128.611	250	No
SOx	6.794	250	No
PM 10	-5.827	250	No
PM 2.5	-5.300	250	No
Pb	0.000	25	No
NH3	0.000	250	No

None of the estimated annual net emissions associated with this action are above the insignificance indicators; therefore, the action will not cause or contribute to an exceedance of one or more NAAQs and will have an insignificant impact on air quality. No further air assessment is needed.

Carolyn Hein, Contractor

Mar 04 2026

Name, Title

Date

Vance AFB ROI: Alternative 1 ACAM Detail Report

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: T-7A Recapitalization at Vance AFB - Alternative 1

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2028

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

- Point of Contact

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:
Phone Number:

Report generated with ACAM version: 5.0.24a

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	MILCON and UMMC: Construct Hush House Pad
3.	Construction / Demolition	MILCON and UMMC: Construct T-7A Shelters
4.	Construction / Demolition	MILCON and UMMC: Addition to Egress Shop
5.	Heating	MILCON and UMMC: Addition to Egress Shop (Heating)
6.	Construction / Demolition	MILCON and UMMC: Construct Jet Blast Deflectors
7.	Construction / Demolition	FSRM: Airfield Reconfiguration
8.	Paint Booth	FSRM: Airfield Reconfiguration
9.	Construction / Demolition	FSRM: Renovate Squad Operations
10.	Construction / Demolition	FSRM: Modify Hangar
11.	Construction / Demolition	FSRM: Antenna Farm
12.	Construction / Demolition	FSRM: Remove Aboveground Service Modules of the CASS
13.	Construction / Demolition	FSRM: Munitions Storage for T-7A
14.	Construction / Demolition	FSRM: Renovate GBTS Facility
15.	Construction / Demolition	FSRM: Renovate UMT Facility
16.	Personnel	Transitional Increase of 100 Personnel
17.	Aircraft	2032 Add T-7As and LTOs
18.	Aircraft	2032 Add T-7A CPs
19.	Aircraft	2032 Remove T-38C LTOs
20.	Aircraft	2032 Remove T-38C CPs
21.	Aircraft	2033 Add T-7As and LTOs
22.	Aircraft	2033 Add T-7A CPs
23.	Aircraft	2033 Remove T-38Cs and LTOs
24.	Aircraft	2033 Remove T-38C CPs
25.	Aircraft	2034 Add T-7A LTOs
26.	Aircraft	2034 Add T-7A CPs
27.	Aircraft	2034 Remove T-38Cs and LTOs
28.	Aircraft	2034 Remove T-38C CPs

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct Hush House Pad

- Activity Description:

Construction of the Hush House (27,500 SF) would occur over a 2-year period from January 2028 through December 2029.

Site grading would occur on the entire site (27,500 SF). Site grading would begin in January 2028 and last approximately 4 months.

Trenching for the reinforced concrete and utilities would occur over the entire site (27,500 SF). It was assumed excavated fill would be reused in place. Trenching would begin in May 2028 and last approximately 4 months.

Construction of the new hush house pad would total approximately 27,500 square feet. Construction would include concrete mixers, rollers, and similar equipment. Construction would begin in September 2028 and last approximately 16 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 0
End Month: 2030

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.153778
SO _x	0.002670
NO _x	1.274077
CO	1.911912

Pollutant	Total Emissions (TONs)
PM 10	2.238710
PM 2.5	0.046135
Pb	0.000000
NH ₃	0.002962

- Global Scale Activity Emissions of Greenhouse Gases:

Pollutant	Total Emissions (TONs)
CH ₄	0.011710
N ₂ O	0.002915

Pollutant	Total Emissions (TONs)
CO ₂	291.192335
CO ₂ e	292.353729

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 4
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 27500
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes

Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDBGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDBGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02137	0.00427	526.92217	528.73043
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 4
Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 27500
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.3 Building Construction Phase

2.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 9
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 16
 Number of Days: 0

2.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 27500
 Height of Building (ft): 5
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Pavers Composite	1	8
Paving Equipment Composite	1	8
Plate Compactors Composite	1	8
Rollers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Plate Compactors Composite [HP: 8] [LF: 0.43]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.54681	0.00884	4.14341	3.47054	0.16191	0.14895
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Plate Compactors Composite [HP: 8] [LF: 0.43]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02306	0.00461	568.38895	570.33952
Rollers Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02382	0.00476	587.11688	589.13172

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530

HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct T-7A Shelters

- Activity Description:

Construction of aircraft shelters (sunshades) sufficient for 68 T-7A aircraft would occur over a 2-year period from January 2028 through December 2029.

Demolition would be required for the existing T-38C shelters. Demolition would include removal of sunshades totaling approximately 210,000 square feet. Demolition would begin in January 2028 and last approximately 12 months.

Construction would include installation of sunshades totaling approximately 225,000 square feet. The height of all sunshades were assumed to be 15 feet. Construction would begin in July 2029 and last approximately 12 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.232212
SO _x	0.005138
NO _x	1.998566
CO	3.059633

Pollutant	Total Emissions (TONs)
PM 10	0.715920
PM 2.5	0.050051
Pb	0.000000
NH ₃	0.010040

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
-----------	------------------------

Pollutant	Total Emissions (TONs)
-----------	------------------------

CH ₄	0.021485
N ₂ O	0.019380

CO ₂	588.995147
CO _{2e}	595.307277

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 12
 Number of Days: 0

3.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 210000
 Height of Building to be demolished (ft): 15

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.37038	0.00743	3.34376	4.27147	0.05770	0.05308
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02330	0.00466	574.37549	576.34660
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building being demolish (ft²)
 BH: Height of Building being demolish (ft)
 (1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
 0.25: Volume reduction factor (material reduced by 75% to account for air space)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration

Number of Month: 12
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 225000
Height of Building (ft): 15
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	7
Forklifts Composite	2	7
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18169	0.00487	1.48384	1.60558	0.06213	0.05716
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.20953	0.00487	1.95558	3.56978	0.07013	0.06452
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53409	0.00793	4.27579	2.84227	0.16774	0.15432
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17058	0.00489	1.70745	3.50145	0.04350	0.04002

Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.38855	0.00735	3.31273	4.40680	0.05338	0.04911

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02140	0.00428	527.61055	529.42117
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02138	0.00428	527.07594	528.88473
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02305	0.00461	568.31695	570.26726
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02147	0.00429	529.26401	531.08031
Welders Composite [HP: 46] [LF: 0.45]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02305	0.00461	568.30128	570.25154

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

3.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Addition to Egress Shop

- Activity Description:

Construction of the addition to the Egress Shop would occur over a 2-year period from January 2028 through December 2029.

Site grading would occur on the site of the addition, 3,200 SF. Site grading would begin in January 2028 and last approximately 1 month.

Construction of the Egress Shop addition would total approximately 3,200 SF. The height of the addition was assumed to be 20 feet. Construction would begin in February 2028 and last approximately 22 months.

Architectural coatings would be applied to the addition, totaling 3,200 square feet. Architectural coating application would begin in December 2029 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.111341
SO _x	0.002536
NO _x	0.912891
CO	1.512980

Pollutant	Total Emissions (TONs)
PM 10	0.066222
PM 2.5	0.031627
Pb	0.000000
NH ₃	0.002376

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.011467
N ₂ O	0.002625

Pollutant	Total Emissions (TONs)
CO ₂	284.182210
CO ₂ e	285.250971

4.1 Site Grading Phase

4.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

4.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 3200
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02137	0.00427	526.92217	528.73043

Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO_{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)

HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

4.2 Building Construction Phase

4.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 2
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 22
 Number of Days: 0

4.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 3200
 Height of Building (ft): 20
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

4.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843

HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 BA : Area of Building (ft²)
 BH : Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT : Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

4.3 Architectural Coatings Phase

4.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2029

- Phase Duration

Number of Month: 1
Number of Days: 0

4.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 1
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
--	------	------	------	------	------	------	----

POVs	50.00	50.00	0	0	0	0	0
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4.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

1: Conversion Factor man days to trips (1 trip / 1 man * day)

WT: Average Worker Round Trip Commute (mile)

PA: Paint Area (ft²)

800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)

BA: Area of Building (ft²)

2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)

0.0116: Emission Factor (lb/ft²)

2000: Conversion Factor pounds to tons

5. Heating

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Addition to Egress Shop (Heating)

- Activity Description:

Heating/cooling for the new addition would begin following the construction period, or approximately January 2030. Heating/cooling would be required as follows:
 Addition to the Egress Shop – 3,200 SF

- Activity Start Date

Start Month: 1
 Start Year: 2030

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000795
SO _x	0.000087
NO _x	0.014461
CO	0.012147

Pollutant	Emissions Per Year (TONs)
PM 10	0.001099
PM 2.5	0.001099
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.000327
N ₂ O	0.000327

Pollutant	Emissions Per Year (TONs)
CO ₂	17.355890
CO ₂ e	17.373822

5.2 Heating Assumptions

- Heating

Heating Calculation Type: Heat Energy Requirement Method

- Heat Energy Requirement Method

Area of floorspace to be heated (ft²): 3200
 Type of fuel: Natural Gas
 Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
 Heat Value (MMBtu/ft³): 0.00105
 Energy Intensity (MMBtu/ft²): 0.0949

- Default Settings Used: Yes

- Boiler/Furnace Usage

Operating Time Per Year (hours): 900 (default)

5.3 Heating Emission Factor(s)

- Heating Criteria Pollutant Emission Factors (lb/1000000 scf)

VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃
-----	-----------------	-----------------	----	-------	--------	----	-----------------

5.5	0.6	100	84	7.6	7.6		
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- Heating Greenhouse Gasses Pollutant Emission Factors (lb/1000000 scf)

CH ₄	N ₂ O	CO ₂	CO ₂ e
2.26	2.26	120019	120143

5.4 Heating Formula(s)

- Heating Fuel Consumption ft³ per Year

$$FC_{HER} = HA * EI / HV / 1000000$$

FC_{HER}: Fuel Consumption for Heat Energy Requirement Method

HA: Area of floorspace to be heated (ft²)

EI: Energy Intensity Requirement (MMBtu/ft²)

HV: Heat Value (MMBTU/ft³)

1000000: Conversion Factor

- Heating Emissions per Year

$$HE_{POL} = FC * EF_{POL} / 2000$$

HE_{POL}: Heating Emission Emissions (TONs)

FC: Fuel Consumption

EF_{POL}: Emission Factor for Pollutant

2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct Jet Blast Deflectors

- Activity Description:

Construction of the jet blast deflectors would occur over a 2-year period from January 2028 through December 2029.

Construction of the deflectors would total approximately 48,000 square feet. The height of the deflectors was assumed to be 12 feet. Construction would begin in January 2028 and last approximately 24 months.

- Activity Start Date

Start Month: 1

Start Month: 2028

- Activity End Date

Indefinite: False

End Month: 0

End Month: 2030

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.286027

Pollutant	Total Emissions (TONs)
PM 10	0.067021

SO _x	0.005741
NO _x	2.261351
CO	3.314160

PM 2.5	0.061639
Pb	0.000000
NH ₃	0.005484

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.022750
N ₂ O	0.006502

Pollutant	Total Emissions (TONs)
CO ₂	568.951781
CO ₂ e	571.457766

6.1 Building Construction Phase

6.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 24
 Number of Days: 0

6.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 48000
 Height of Building (ft): 12
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

6.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
--	-----------------	------------------	-----------------	-------------------

LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

6.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Airfield Reconfiguration

- Activity Description:

Airfield reconfiguration would include airfield markings, installation of mooring and anchor rods, and relocation of the compass rose and trim pad. Activities would occur over a 1-year period starting in January 2028 (painting activities would occur from September through December 2028 and are captured in a separate Paint Booth activity).

Trenching/excavation for the mooring and anchor rods was estimated to occur on 100 SF. Excavation of the existing of the existing compass rose and trim pad (and access road) would be required (approx. 30,000 SF). Excavation would begin in January 2028 and last approximately 2 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

The construction activity as used to characterize removal of existing airfield markings. Grinders would likely be used to remove existing paint, estimated at 50,000 SF. Paint removal would begin in March 2028 and last approximately 3 months.

Paving would be required for the relocated compass rose and trim pad (approx. 30,000 SF). Paving would begin in June 2028 and last approximately 3 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 8
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.047361
SO _x	0.000830
NO _x	0.370542
CO	0.577895

Pollutant	Total Emissions (TONs)
PM 10	0.609917
PM 2.5	0.010162
Pb	0.000000
NH ₃	0.001156

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.003301
N ₂ O	0.000867

Pollutant	Total Emissions (TONs)
CO ₂	82.279880
CO ₂ e	82.620532

7.1 Trenching/Excavating Phase

7.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 2
 Number of Days: 0

7.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 30100
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)

WD: Number of Total Work Days (days)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)

HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

7.2 Building Construction Phase

7.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 3
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 3
 Number of Days: 0

7.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 30000
 Height of Building (ft): 1
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	2	8
Generator Sets Composite	1	8
Pressure Washers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

7.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.37038	0.00743	3.34376	4.27147	0.05770	0.05308
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Pressure Washers Composite [HP: 14] [LF: 0.3]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.52107	0.00857	4.30894	3.24344	0.17290	0.15907

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02330	0.00466	574.37549	576.34660
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Pressure Washers Composite [HP: 14] [LF: 0.3]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02345	0.00469	578.03386	580.01752

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.3 Paving Phase

7.3.1 Paving Phase Timeline Assumptions

- Phase Start Date

Start Month: 6
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 3

Number of Days: 0

7.3.2 Paving Phase Assumptions

- General Paving Information

Paving Area (ft²): 30000

- Paving Default Settings

Default Settings Used: No

Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	1	8
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.3.3 Paving Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Rollers Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02382	0.00476	587.11688	589.13172
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.3.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 PA: Paving Area (ft²)
 0.25: Thickness of Paving Area (ft)
 (1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_P = (2.62 * PA) / 43560 / 2000$$

VOC_P: Paving VOC Emissions (TONs)
 2.62: Emission Factor (lb/acre)
 PA: Paving Area (ft²)
 43560: Conversion Factor square feet to acre (43560 ft² / acre)² / acre)
 2000: Conversion Factor square pounds to TONs (2000 lb / TON)

8. Paint Booth

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** FSRM: Airfield Reconfiguration

- **Activity Description:**

Painting activities would be a continuation of the airfield reconfiguration construction activity. Painting was estimated at 150 gallons. Asphalt/Concrete Paint would be used (TT-P-1952E Type III used as surrogate to estimate for VOC content). Painting would begin in September 2028 and last approximately 4 months.

- **Activity Start Date**

Start Month: 9
Start Year: 2028

- **Activity End Date**

Indefinite: No
End Month: 12
End Year: 2028

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Total Emissions (TONs)
VOC	0.009498
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Total Emissions (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Total Emissions (TONs)
CH ₄	0.000000
N ₂ O	0.000000

Pollutant	Total Emissions (TONs)
CO ₂	0.000000
CO ₂ e	0.000000

8.2 Paint Booth Assumptions

- **Paint Booth**

Coating throughput (gallons/year): 150

- **Default Settings Used:** No

- **Paint Booth Consumption**

Coating used: Asphalt/Concrete Paint (TT-P-1952E Type III used as surrogate)
Specific gravity of coating: 1.4
Coating VOC content by weight (%): 6.5
Efficiency of control device (%): 50

8.3 Paint Booth Formula(s)

- **Paint Booth Emissions per Year**

$$PBE_{VOC} = (VOC / 100) * CT * SG * 8.35 * (1 - (CD / 100)) / 2000$$

PBE_{VOC}: Paint Booth VOC Emissions (TONs per Year)

VOC: Coating VOC content by weight (%)

(VOC / 100): Conversion Factor percent to decimal

CT: Coating throughput (gallons/year)

SG: Specific gravity of coating

8.35: Conversion Factor the density of water

CD: Efficiency of control device (%)

(1 - (CD / 100)): Conversion Factor percent to decimal (Not effected by control device)

2000: Conversion Factor pounds to tons

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate Squad Operations

- Activity Description:

Squadron Operations Buildings Renovations (i.e., Buildings 179, 183, 541, and 690) would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the buildings (Building 179 = approximately 25,000 SF; Building 183 = approximately 26,000 SF; Building 541 = approximately 20,000 SF; Building 690 = approximately 27,000 SF) would be construction to equate the renovations (98,000 SF * 0.25 = 24,500 SF). The height of the buildings was assumed to be 30 feet. Renovations would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (98,000 square feet) following the renovations. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1

Start Month: 2028

- Activity End Date

Indefinite: False

End Month: 12

End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.268596
SO _x	0.002665
NO _x	1.051974
CO	1.530178

Pollutant	Total Emissions (TONs)
PM 10	0.030950
PM 2.5	0.028465
Pb	0.000000
NH ₃	0.003075

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.010622
N ₂ O	0.004360

Pollutant	Total Emissions (TONs)
CO ₂	270.846073
CO ₂ e	272.410715

9.1 Building Construction Phase

9.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1

Start Quarter: 1

Start Year: 2028

- Phase Duration

Number of Month: 11

Number of Days: 0

9.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 24500
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

9.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

9.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

9.2 Architectural Coatings Phase

9.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 1
 Number of Days: 0

9.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 98000
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

9.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

9.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft²)
800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft²)
2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
0.0116: Emission Factor (lb/ft²)
2000: Conversion Factor pounds to tons

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Modify Hangar

- Activity Description:

Modification of Building 199 would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the hangar (Building 199 = approximately 50,000 SF) would be construction to equate the renovations (50,000 SF * 0.25 = 12,500 SF). The height of the hangars was assumed to be 30 feet. Renovations would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (50,000 SF) following the renovations. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.716278
SO _x	0.002882
NO _x	1.151333
CO	1.601794

Pollutant	Total Emissions (TONs)
PM 10	0.032436
PM 2.5	0.029832
Pb	0.000000
NH ₃	0.006668

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.011873
N ₂ O	0.013192

Pollutant	Total Emissions (TONs)
CO ₂	335.348551
CO ₂ e	339.576543

10.1 Building Construction Phase

10.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 11
 Number of Days: 0

10.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 125000
 Height of Building (ft): 30
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDTV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

10.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

10.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

10.2 Architectural Coatings Phase

10.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

10.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 50000
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

10.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃

LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

10.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 1: Conversion Factor man days to trips (1 trip / 1 man * day)
- WT: Average Worker Round Trip Commute (mile)
- PA: Paint Area (ft²)
- 800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL}: Vehicle Emissions (TONs)
- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL}: Emission Factor for Pollutant (grams/mile)
- VM: Worker Trips On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

- VOC_{AC}: Architectural Coating VOC Emissions (TONs)
- BA: Area of Building (ft²)
- 2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
- 0.0116: Emission Factor (lb/ft²)
- 2000: Conversion Factor pounds to tons

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

- Activity Location

- County: Garfield
- Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** FSRM: Antenna Farm

- **Activity Description:**

Construction of the antenna farm near Building 199 would occur over a 1-year period starting in January 2028.

It was assumed approximately 5,000 square feet would be trenched and excavated for installation of the antenna farm. Trenching/excavation would begin in January 2028 and last approximately 12 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

- **Activity Start Date**

Start Month: 1
Start Year: 2028

- **Activity End Date**

Indefinite: False
End Month: 12
End Year: 2028

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	0.052824
SO _x	0.000887
NO _x	0.431647
CO	0.739787

Pollutant	Total Emissions (TONs)
PM 10	0.607823
PM 2.5	0.010065
Pb	0.000000
NH ₃	0.001199

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Total Emissions (TONs)
CH ₄	0.004061
N ₂ O	0.000891

Pollutant	Total Emissions (TONs)
CO ₂	100.548713
CO ₂ e	100.915511

11.1 Trenching/Excavating Phase

11.1.1 Trenching / Excavating Phase Timeline Assumptions

- **Phase Start Date**

Start Month: 1
Start Quarter: 1
Start Year: 2028

- **Phase Duration**

Number of Month: 12
Number of Days: 0

11.1.2 Trenching / Excavating Phase Assumptions

- **General Trenching/Excavating Information**

Area of Site to be Trenched/Excavated (ft²): 5000
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- **Trenching Default Settings**

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- **Construction Exhaust (default)**

Equipment Name	Number Of Equipment	Hours Per Day
----------------	---------------------	---------------

Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

11.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134

LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

11.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VE} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Remove Aboveground Service Modules of the CASS

- Activity Description:

Removal of T-39C CASS modules would occur over a 1-year period starting in January 2028.

It was assumed approximately 1,000 SF would be excavated and filled for CASS removal. Excavation would begin in January 2028 and last approximately 12 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.052824
SO _x	0.000887
NO _x	0.431647
CO	0.739787

Pollutant	Total Emissions (TONs)
PM 10	0.130321
PM 2.5	0.010065
Pb	0.000000
NH ₃	0.001199

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.004061
N ₂ O	0.000891

Pollutant	Total Emissions (TONs)
CO ₂	100.548713
CO ₂ e	100.915511

12.1 Trenching/Excavating Phase

12.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1

Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 12
 Number of Days: 0

12.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 1000
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

12.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}

Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

12.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM_{10FD} = (20 * ACRE * WD) / 2000$$

PM_{10FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Munitions Storage for T-7A

- Activity Description:

Construction of the concrete pad for munitions storage would occur over a 1-year period starting in January 2028.

Site grading would occur on the entire site (3,600 SF). Site grading would begin in January 2028 and last approximately 2 months.

Trenching for the concrete pad would occur over the entire site (3,600 SF). It was assumed excavated fill would be reused in place. Trenching would begin in March 2028 and last approximately 2 months.

Construction of the pad would total approximately 3,600 square feet. Construction would include concrete mixers, rollers, and similar equipment. Construction would begin in May 2028 and last approximately 8 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.077814
SO _x	0.001361
NO _x	0.646896
CO	0.975428

Pollutant	Total Emissions (TONs)
PM 10	0.168659
PM 2.5	0.023370
Pb	0.000000
NH ₃	0.001421

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005965
N ₂ O	0.001335

Pollutant	Total Emissions (TONs)
CO ₂	147.742739
CO ₂ e	148.289697

13.1 Site Grading Phase

13.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 2
Number of Days: 0

13.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 3600
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02137	0.00427	526.92217	528.73043
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002

HDTV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM_{10FD} = (20 * ACRE * WD) / 2000$$

PM_{10FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL} : Vehicle Emissions (TONs)
- VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL} : Emission Factor for Pollutant (grams/mile)
- VM: Worker Trips On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

13.2 Trenching/Excavating Phase

13.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

- Start Month:** 3
- Start Quarter:** 1
- Start Year:** 2028

- Phase Duration

- Number of Month:** 2
- Number of Days:** 0

13.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

- Area of Site to be Trenched/Excavated (ft²):** 3600
- Amount of Material to be Hauled On-Site (yd³):** 0
- Amount of Material to be Hauled Off-Site (yd³):** 0

- Trenching Default Settings

- Default Settings Used:** Yes
- Average Day(s) worked per week:** 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

- Average Hauling Truck Capacity (yd³):** 20 (default)
- Average Hauling Truck Round Trip Commute (mile):** 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

- Average Worker Round Trip Commute (mile):** 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)

WD: Number of Total Work Days (days)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

13.3 Building Construction Phase

13.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 8

Number of Days: 0

13.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial

Area of Building (ft²): 3600

Height of Building (ft): 5

Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No

Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Pavers Composite	1	8
Paving Equipment Composite	1	9
Plate Compactors Composite	1	8
Rollers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

13.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699

Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Plate Compactors Composite [HP: 8] [LF: 0.43]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.54681	0.00884	4.14341	3.47054	0.16191	0.14895
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Plate Compactors Composite [HP: 8] [LF: 0.43]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02306	0.00461	568.38895	570.33952
Rollers Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02382	0.00476	587.11688	589.13172

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

14. Construction / Demolition

14.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate GBTS Facility

- Activity Description:

GBTS facility renovations (Building 672) would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the building (approximately 27,000 SF) would be construction to equate the renovations (27,000 SF * 0.25 = 6,750 SF). The height of the building was assumed to be 30 feet. Renovation would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (27,000 square feet) following the renovation. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.362774
SO _x	0.001176
NO _x	0.408308
CO	0.692829

Pollutant	Total Emissions (TONs)
PM 10	0.014832
PM 2.5	0.013641
Pb	0.000000
NH ₃	0.001341

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005341
N ₂ O	0.001716

Pollutant	Total Emissions (TONs)
CO ₂	134.296221
CO ₂ e	134.941034

14.1 Building Construction Phase

14.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 11

Number of Days: 0

14.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 6750
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

14.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

14.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 WD : Number of Total Work Days (days)
 WT : Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE : Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 BA : Area of Building (ft²)
 BH : Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT : Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

14.2 Architectural Coatings Phase

14.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

14.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 27000
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

14.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

14.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 1: Conversion Factor man days to trips (1 trip / 1 man * day)
 WT: Average Worker Round Trip Commute (mile)
 PA: Paint Area (ft²)
 800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
 $VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
 BA: Area of Building (ft²)
 2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
 0.0116: Emission Factor (lb/ft²)
 2000: Conversion Factor pounds to tons

15. Construction / Demolition

15.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate UMT Facility

- Activity Description:

UMT facility renovations would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the building (approximately 12,000 SF) would be construction to equate the renovations (12,000 SF * 0.25 = 3,000 SF). The height of the building was assumed to be 30 feet. Renovation would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (12,000 square feet) following the renovation. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.188607
SO _x	0.001168
NO _x	0.404600
CO	0.690157

Pollutant	Total Emissions (TONs)
PM 10	0.014776
PM 2.5	0.013590
Pb	0.000000
NH ₃	0.001207

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005294
N ₂ O	0.001387

Pollutant	Total Emissions (TONs)
CO ₂	131.889412
CO ₂ e	132.434846

15.1 Building Construction Phase

15.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 11
 Number of Days: 0

15.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 3000
 Height of Building (ft): 30
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

15.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

15.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

15.2 Architectural Coatings Phase

15.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

15.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 12000
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

15.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

15.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 1: Conversion Factor man days to trips (1 trip / 1 man * day)
 WT: Average Worker Round Trip Commute (mile)

PA: Paint Area (ft²)

800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)

BA: Area of Building (ft²)

2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)

0.0116: Emission Factor (lb/ft²)

2000: Conversion Factor pounds to tons

16. Personnel

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Transitional Increase of 100 Personnel

- Activity Description:

Increase of 100 personnel during the T-7A and T-38C transition period (i.e., 2032 through 2034). Assumed all personnel commute daily.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: No

End Month: 12

End Year: 2034

- Activity Emissions of Criteria Pollutants:

Pollutant	Total Emissions (TONs)
VOC	0.409993
SO _x	0.003005
NO _x	0.124758
CO	5.234423

Pollutant	Total Emissions (TONs)
PM 10	0.008724
PM 2.5	0.007714
Pb	0.000000
NH ₃	0.065363

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
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Pollutant	Total Emissions (TONs)
-----------	------------------------

CH ₄	0.021932
N ₂ O	0.008188

CO ₂	595.161765
CO _{2e}	598.146855

16.2 Personnel Assumptions

- Number of Personnel

Active Duty Personnel:	100
Civilian Personnel:	0
Support Contractor Personnel:	0
Air National Guard (ANG) Personnel:	0
Reserve Personnel:	0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule

Active Duty Personnel:	5 Days Per Week (default)
Civilian Personnel:	5 Days Per Week (default)
Support Contractor Personnel:	5 Days Per Week (default)
Air National Guard (ANG) Personnel:	4 Days Per Week (default)
Reserve Personnel:	4 Days Per Month (default)

16.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

16.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.27401	0.00192	0.08002	3.26598	0.01846	0.00655	0.04266
LDGT	0.20829	0.00258	0.11094	2.94852	0.01931	0.00714	0.03597
HDGV	0.53636	0.00582	0.33268	6.74281	0.04022	0.01923	0.08091
LDDV	0.10489	0.00121	0.14594	6.81082	0.02151	0.00818	0.01655
LDDT	0.08795	0.00116	0.14309	2.36609	0.01868	0.00677	0.01516
HDDV	0.06534	0.00394	1.43715	1.30874	0.11975	0.04718	0.06930
MC	2.41491	0.00283	0.65152	11.08874	0.02922	0.02059	0.05712

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01175	0.00448	271.98834	273.50441
LDGT	0.01197	0.00603	364.95167	366.88528
HDGV	0.03303	0.01988	825.01800	831.21040
LDDV	0.05557	0.00065	360.25469	361.98343
LDDT	0.02891	0.00094	345.63221	346.69024
HDDV	0.02446	0.17008	1177.21662	1222.97273
MC	0.09040	0.00267	394.35934	397.59777

16.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$$VMT_p = NP * WD * AC$$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
 NP: Number of Personnel
 WD: Work Days per Year
 AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$$

VMT_{Total}: Total Vehicle Miles Travel (miles)
 VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
 VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
 VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
 VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
 VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

$$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{Total}: Total Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Personnel On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-7As and LTOs

- Activity Description:

In 2032, add 24 T-7As and 2,192 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 1,447 CPs.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	22.039823
SO _x	2.866242
NO _x	39.551407
CO	192.198932

PM 10	4.107090
PM 2.5	3.706036
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.351027
N ₂ O	0.067975

Pollutant	Emissions Per Year (TONs)
CO ₂	8489.671572
CO ₂ e	8517.520140

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	21.475331
SO _x	2.725176
NO _x	36.539768
CO	188.277038

Pollutant	Emissions Per Year (TONs)
PM 10	3.740281
PM 2.5	3.356638
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.337873
N ₂ O	0.065385

Pollutant	Emissions Per Year (TONs)
CO ₂	8173.025950
CO ₂ e	8199.805076

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.303368
SO _x	0.069219
NO _x	1.014204
CO	3.491011

Pollutant	Emissions Per Year (TONs)
PM 10	0.074669
PM 2.5	0.066940
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008714
N ₂ O	0.001700

Pollutant	Emissions Per Year (TONs)
CO ₂	207.231174
CO ₂ e	207.925675

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.261125
SO _x	0.071848
NO _x	1.997434
CO	0.430883

Pollutant	Emissions Per Year (TONs)
PM 10	0.292140
PM 2.5	0.282458
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004440
N ₂ O	0.000891

Pollutant	Emissions Per Year (TONs)
CO ₂	109.414447
CO ₂ e	109.789389

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	LTO (Landing and Takeoff)	
Number of Annual Flight Operation Cycles for all Aircraft:		2192
Number of Annual Trim Test(s) per Aircraft:		15

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

17.4 Auxiliary Power Unit (APU)

17.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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4501687C	211.0	0.0	0.0	740.4	740.7
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17.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

- APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
- APU: Number of Auxiliary Power Units
- OH: Operation Hours for Each LTO (hour)
- LTO: Number of LTOs
- EF_{POL}: Emission Factor for Pollutant (lb/hr)
- 2000: Conversion Factor pounds to tons

17.5 Aircraft Engine Test Cell

17.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: No

- Annual Run-ups / Test Durations

- Annual Run-ups (Per Aircraft Engine):** 1
- Idle Duration (mins):** 12
- Approach Duration (mins):** 27
- Intermediate Duration (mins):** 9
- Military Duration (mins):** 9
- After Burner Duration (mins):** 3

17.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

17.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$$

- TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Total Number of Engines (For All Aircraft)
- ARU: Annual Run-ups (Per Aircraft Engine)
- 2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$$

- TestCell: Aircraft Engine Test Cell Emissions (TONs)
- TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
- TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
 TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
 TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

17.6 Aerospace Ground Equipment (AGE)

17.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 2192

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

17.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

17.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-7A CPs

- Activity Description:

In 2032, add 3409 T-7A CPs not within an LTO.

1447 CPs within an LTO + 3409 CPs not included in an LTO = 4856 CPs in 2032

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.000376
SO _x	0.573952
NO _x	8.894856
CO	1.733973

Pollutant	Emissions Per Year (TONs)
PM 10	0.063829
PM 2.5	0.054631
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.072254
N ₂ O	0.014097

Pollutant	Emissions Per Year (TONs)
CO ₂	1718.335817
CO ₂ e	1724.094535

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.000376
SO _x	0.573952
NO _x	8.894856
CO	1.733973

Pollutant	Emissions Per Year (TONs)
PM 10	0.063829
PM 2.5	0.054631
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.072254
N ₂ O	0.014097

Pollutant	Emissions Per Year (TONs)
CO ₂	1718.335817
CO ₂ e	1724.094535

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	3409
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	2.22
Climb Out [Intermediate] (mins):	1.38
Takeoff [Military] (mins):	0.38
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Garfield
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2032 Remove T-38C LTOs
- Activity Description:
 - In 2032, decrease T-38C LTOs by 1,583.
 - Includes 1,045 CPs.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-4.777238
SO _x	-0.459750
NO _x	-0.915495
CO	-53.293148

Pollutant	Emissions Per Year (TONs)
PM 10	-1.252086
PM 2.5	-1.126301
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.057877
N ₂ O	-0.011292

Pollutant	Emissions Per Year (TONs)
CO ₂	-1376.431350
CO ₂ e	-1381.044232

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-4.777238
SO _x	-0.459750
NO _x	-0.915495
CO	-53.293148

Pollutant	Emissions Per Year (TONs)
PM 10	-1.252086
PM 2.5	-1.126301
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.057877
N ₂ O	-0.011292

Pollutant	Emissions Per Year (TONs)
CO ₂	-1376.431350
CO ₂ e	-1381.044232

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23

Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	1583
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

19.4 Auxiliary Power Unit (APU)

19.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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19.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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19.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)

APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Remove T-38C CPs

- Activity Description:

In 2032, decrease T-38C CPs by 2,462.

1,045 CPs within an LTO + 2,462 CPs not within an LTO = 3,507 CPs in 2032.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.704339
SO _x	-0.170900
NO _x	-0.164131
CO	-12.658037

Pollutant	Emissions Per Year (TONs)
PM 10	-0.302882
PM 2.5	-0.271772
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.021514
N ₂ O	-0.004197

Pollutant	Emissions Per Year (TONs)
CO ₂	-511.651443
CO ₂ e	-513.366158

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.704339
SO _x	-0.170900
NO _x	-0.164131
CO	-12.658037

Pollutant	Emissions Per Year (TONs)
PM 10	-0.302882
PM 2.5	-0.271772
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	-0.021514	CO ₂	-511.651443
N ₂ O	-0.004197	CO ₂ e	-513.366158

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 2462
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.27
Climb Out [Intermediate] (mins): 1.42

Takeoff [Military] (mins): 0.39
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Add T-7As and LTOs

- Activity Description:

In 2033, add 44 T-7As and 10,717 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 7,073 CPs.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	78.026992
SO _x	7.818368
NO _x	106.503869
CO	432.426421

Pollutant	Emissions Per Year (TONs)
PM 10	9.006450
PM 2.5	8.175824
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.936331
N ₂ O	0.180184

Pollutant	Emissions Per Year (TONs)
CO ₂	22959.899360
CO ₂ e	23033.896718

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	76.194141
SO _x	7.340192
NO _x	94.878754
CO	423.919588

Pollutant	Emissions Per Year (TONs)
PM 10	7.441242
PM 2.5	6.672122
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
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CH ₄	0.898649
N ₂ O	0.172713

CO ₂	22045.032735
CO ₂ e	22115.923698

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.556174
SO _x	0.126901
NO _x	1.859374
CO	6.400188

Pollutant	Emissions Per Year (TONs)
PM 10	0.136894
PM 2.5	0.122723
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015975
N ₂ O	0.003117

Pollutant	Emissions Per Year (TONs)
CO ₂	379.923820
CO ₂ e	381.197071

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.276677
SO _x	0.351276
NO _x	9.765740
CO	2.106646

Pollutant	Emissions Per Year (TONs)
PM 10	1.428315
PM 2.5	1.380979
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.021707
N ₂ O	0.004354

Pollutant	Emissions Per Year (TONs)
CO ₂	534.942806
CO ₂ e	536.775949

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 44
Flight Operation Cycle Type: LTO (Landing and Takeoff)

Number of Annual Flight Operation Cycles for all Aircraft: 10717
Number of Annual Trim Test(s) per Aircraft: 15

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

21.4 Auxiliary Power Unit (APU)

21.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
4501687C	211.0	0.0	0.0	740.4	740.7

21.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL} : Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL} : Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

21.5 Aircraft Engine Test Cell

21.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 44

- **Default Settings Used:** No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine): 1
Idle Duration (mins): 12
Approach Duration (mins): 27
Intermediate Duration (mins): 9
Military Duration (mins): 9
After Burner Duration (mins): 3

21.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

21.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$\text{TestCellPS}_{\text{POL}} = (\text{TD} / 60) * (\text{FC} / 1000) * \text{EF} * \text{NE} * \text{ARU} / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$\text{TestCell} = \text{TestCellPS}_{\text{IDLE}} + \text{TestCellPS}_{\text{APPROACH}} + \text{TestCellPS}_{\text{INTERMEDIATE}} + \text{TestCellPS}_{\text{MILITARY}} + \text{TestCellPS}_{\text{AFTERBURN}}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

21.6 Aerospace Ground Equipment (AGE)

21.6.1 Aerospace Ground Equipment (AGE) Assumptions

- **Default Settings Used:** Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 10717

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1

1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

21.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

21.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Add T-7A CPs

- Activity Description:

In 2033, add 16,665 T-7A CPs not within an LTO.

7073 CPs within an LTO + 16,665 CPs not within an LTO = 23738 CPs in 2033

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	4.890371
SO _x	2.805780
NO _x	43.482773
CO	8.476580

Pollutant	Emissions Per Year (TONs)
PM 10	0.312030
PM 2.5	0.267065
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.353214
N ₂ O	0.068912

Pollutant	Emissions Per Year (TONs)
CO ₂	8400.136810
CO ₂ e	8428.288481

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.890371
SO _x	2.805780
NO _x	43.482773
CO	8.476580

Pollutant	Emissions Per Year (TONs)
PM 10	0.312030
PM 2.5	0.267065
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.353214
N ₂ O	0.068912

Pollutant	Emissions Per Year (TONs)
CO ₂	8400.136810
CO ₂ e	8428.288481

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		44
Flight Operation Cycle Type:	CP (Close Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		16665
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0	
Approach [Approach] (mins):	2.22	
Climb Out [Intermediate] (mins):	1.38	
Takeoff [Military] (mins):	0.38	
Takeoff [After Burn] (mins):	0	

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0	
Approach (mins):	0	
Intermediate (mins):	0	
Military (mins):	0	
AfterBurn (mins):	0	

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Remove T-38Cs and LTOs

- Activity Description:

By 2033, remove 14 T-38Cs and 9,925 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 6,552 CPs.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-34.586844
SO _x	-3.861498
NO _x	-17.186178
CO	-373.270878

Pollutant	Emissions Per Year (TONs)
PM 10	-9.803345
PM 2.5	-8.908030
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.465265

Pollutant	Emissions Per Year (TONs)
CO ₂	-11082.275214

N ₂ O	-0.090883
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CO ₂ e	-11119.453016
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- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-33.086316
SO _x	-3.478375
NO _x	-7.994414
CO	-367.273121

Pollutant	Emissions Per Year (TONs)
PM 10	-8.397082
PM 2.5	-7.554083
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.437885
N ₂ O	-0.085432

Pollutant	Emissions Per Year (TONs)
CO ₂	-10413.800801
CO ₂ e	-10448.700934

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.318199
SO _x	-0.057806
NO _x	-0.147725
CO	-4.046794

Pollutant	Emissions Per Year (TONs)
PM 10	-0.083502
PM 2.5	-0.075024
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007277
N ₂ O	-0.001420

Pollutant	Emissions Per Year (TONs)
CO ₂	-173.064565
CO ₂ e	-173.644562

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.182329
SO _x	-0.325317
NO _x	-9.044039
CO	-1.950962

Pollutant	Emissions Per Year (TONs)
PM 10	-1.322760
PM 2.5	-1.278923
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.020103
N ₂ O	-0.004032

Pollutant	Emissions Per Year (TONs)
CO ₂	-495.409849
CO ₂ e	-497.107520

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gases Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	9925
Number of Annual Trim Test(s) per Aircraft:	17

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

23.4 Auxiliary Power Unit (APU)

23.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

23.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
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23.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)

APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

23.5 Aircraft Engine Test Cell

23.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 28

- Default Settings Used: No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	3
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

23.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

23.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONS

- Aircraft Engine Test Cell Emissions per Year

$$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
 TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
 TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
 TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
 TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

23.6 Aerospace Ground Equipment (AGE)

23.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 9925

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

23.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

23.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Remove T-38C CPs

- Activity Description:

By 2033, remove 15,433 T-38C CPs.

6,552 CPs with an LTO + 15,433 CPs not within an LTO = 21,985 CPs in 2033

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-4.415139
SO _x	-1.071282
NO _x	-1.028852
CO	-79.346666

Pollutant	Emissions Per Year (TONs)
PM 10	-1.898609
PM 2.5	-1.703595
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.134861
N ₂ O	-0.026311

Pollutant	Emissions Per Year (TONs)
CO ₂	-3207.277304
CO ₂ e	-3218.025964

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-4.415139
SO _x	-1.071282
NO _x	-1.028852
CO	-79.346666

Pollutant	Emissions Per Year (TONs)
PM 10	-1.898609
PM 2.5	-1.703595
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.134861
N ₂ O	-0.026311

Pollutant	Emissions Per Year (TONs)
CO ₂	-3207.277304
CO ₂ e	-3218.025964

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gases Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 15433
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.27
Climb Out [Intermediate] (mins): 1.42
Takeoff [Military] (mins): 0.39
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0

Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Add T-7A LTOs

- Activity Description:

In 2034, add 3,653 T-7A LTOs.

Includes 2,411 CPs.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	20.081611
SO _x	1.278343
NO _x	15.209630
CO	42.944346

Pollutant	Emissions Per Year (TONs)
PM 10	0.318523
PM 2.5	0.282652
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.152273
N ₂ O	0.028818

Pollutant	Emissions Per Year (TONs)
CO ₂	3850.866527
CO ₂ e	3862.753129

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	20.081611
SO _x	1.278343
NO _x	15.209630
CO	42.944346

Pollutant	Emissions Per Year (TONs)
PM 10	0.318523
PM 2.5	0.282652
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.152273
N ₂ O	0.028818

Pollutant	Emissions Per Year (TONs)
CO ₂	3850.866527
CO ₂ e	3862.753129

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 68
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 3653
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 13.16
Approach [Approach] (mins): 5.18
Climb Out [Intermediate] (mins): 0.49
Takeoff [Military] (mins): 1.01
Takeoff [After Burn] (mins): 0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 15
Approach (mins): 10
Intermediate (mins): 15
Military (mins): 15
AfterBurn (mins): 10

25.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AE_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AE_{POL} : Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{IDLE} + AE_{APPROACH} + AE_{INTERMEDIATE} + AE_{MILITARY} + AE_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 AE_{IDLE} : Aircraft Emissions for Idle Power Setting (TONs)
 $AE_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AE_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AE_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AE_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

25.4 Auxiliary Power Unit (APU)

25.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

25.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
4501687C	211.0	0.0	0.0	740.4	740.7

25.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)

APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Add T-7A CPs

- Activity Description:

In 2034, add 5,682 T-7A CPs not within an LTO.

2411 CPs within an LTO + 5682 CPs not within an LTO = 8093 CPs in 2034.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.667392
SO _x	0.956642
NO _x	14.825629
CO	2.890125

Pollutant	Emissions Per Year (TONs)
PM 10	0.106388
PM 2.5	0.091057
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.120430
N ₂ O	0.023496

Pollutant	Emissions Per Year (TONs)
CO ₂	2864.061047
CO ₂ e	2873.659475

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.667392
SO _x	0.956642
NO _x	14.825629
CO	2.890125

Pollutant	Emissions Per Year (TONs)
PM 10	0.106388
PM 2.5	0.091057
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.120430
N ₂ O	0.023496

Pollutant	Emissions Per Year (TONs)
CO ₂	2864.061047
CO ₂ e	2873.659475

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 5682
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.22
Climb Out [Intermediate] (mins): 1.38
Takeoff [Military] (mins): 0.38
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Remove T-38Cs and LTOs

- Activity Description:

By 2034, remove 49 T-38Cs and 3,836 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 2,530 CPs.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-24.117036
SO _x	-3.527661
NO _x	-14.121764
CO	-260.046394

Pollutant	Emissions Per Year (TONs)
PM 10	-5.751515
PM 2.5	-5.209827
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.436031
N ₂ O	-0.085112

Pollutant	Emissions Per Year (TONs)
CO ₂	-10376.398970
CO ₂ e	-10411.188207

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-22.546371
SO _x	-3.199605
NO _x	-10.109217
CO	-245.128571

Pollutant	Emissions Per Year (TONs)
PM 10	-4.948011
PM 2.5	-4.452940
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.402791
N ₂ O	-0.078585

Pollutant	Emissions Per Year (TONs)
CO ₂	-9579.197711
CO ₂ e	-9611.300810

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.113696
SO _x	-0.202322

Pollutant	Emissions Per Year (TONs)
PM 10	-0.292259
PM 2.5	-0.262586

NO _x	-0.517038
CO	-14.163779

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.025470
N ₂ O	-0.004969

Pollutant	Emissions Per Year (TONs)
CO ₂	-605.725976
CO ₂ e	-607.755967

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.456969
SO _x	-0.125734
NO _x	-3.495510
CO	-0.754044

Pollutant	Emissions Per Year (TONs)
PM 10	-0.511245
PM 2.5	-0.494302
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007770
N ₂ O	-0.001558

Pollutant	Emissions Per Year (TONs)
CO ₂	-191.475283
CO ₂ e	-192.131430

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	3836
Number of Annual Trim Test(s) per Aircraft:	17

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{\text{TRIM}} = AEPS_{\text{IDLE}} + AEPS_{\text{APPROACH}} + AEPS_{\text{INTERMEDIATE}} + AEPS_{\text{MILITARY}} + AEPS_{\text{AFTERBURN}}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27.4 Auxiliary Power Unit (APU)

27.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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27.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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27.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{\text{POL}} = \text{APU} * \text{OH} * \text{LTO} * \text{EF}_{\text{POL}} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

27.5 Aircraft Engine Test Cell

27.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 98

- Default Settings Used: No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine): 3
Idle Duration (mins): 12
Approach Duration (mins): 27
Intermediate Duration (mins): 9
Military Duration (mins): 9
After Burner Duration (mins): 3

27.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

27.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$\text{TestCellPS}_{\text{POL}} = (\text{TD} / 60) * (\text{FC} / 1000) * \text{EF} * \text{NE} * \text{ARU} / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$\text{TestCell} = \text{TestCellPS}_{\text{IDLE}} + \text{TestCellPS}_{\text{APPROACH}} + \text{TestCellPS}_{\text{INTERMEDIATE}} + \text{TestCellPS}_{\text{MILITARY}} + \text{TestCellPS}_{\text{AFTERBURN}}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

27.6 Aerospace Ground Equipment (AGE)

27.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 3836

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp

1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

27.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

27.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Remove T-38C CPs

- Activity Description:

By 2034, remove 5,967 T-38C CPs not within an LTO.

2,530 CPs within an LTO + 5,967 not within an LTO = 8,497 CPs

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-1.707065
SO _x	-0.414199
NO _x	-0.397794
CO	-30.678517

Pollutant	Emissions Per Year (TONs)
PM 10	-0.734076
PM 2.5	-0.658676
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.052143
N ₂ O	-0.010173

Pollutant	Emissions Per Year (TONs)
CO ₂	-1240.058555
CO ₂ e	-1244.214406

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.707065
SO _x	-0.414199
NO _x	-0.397794
CO	-30.678517

Pollutant	Emissions Per Year (TONs)
PM 10	-0.734076
PM 2.5	-0.658676
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.052143
N ₂ O	-0.010173

Pollutant	Emissions Per Year (TONs)
CO ₂	-1240.058555
CO ₂ e	-1244.214406

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

28.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01

After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23
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- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	5967
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	2.27
Climb Out [Intermediate] (mins):	1.42
Takeoff [Military] (mins):	0.39
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

28.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

Vance AFB ROI: Alternative 1 GHG Report

AIR CONFORMITY APPLICABILITY MODEL REPORT GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to estimate GHG emissions associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the GHG emissions analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: T-7A Recapitalization at Vance AFB - Alternative 1

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2028

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

f. Point of Contact:

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:

Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action's start through the action's "steady state" (SS, net gain/loss in emission stabilized and the action is fully implemented) of emissions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO₂ equivalents (CO₂e). The CO₂e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO₂. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO₂e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO₂e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO₂e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected steady state of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	CO₂	CH₄	N₂O	CO₂e	Threshold	Exceedance
2028	1,929	0.07514998	0.03421646	1,942	68,039	No
2029	826	0.03183392	0.01664124	831	68,039	No
2030	16	0.00029648	0.00029648	16	68,039	No
2031	16	0.00029648	0.00029648	16	68,039	No
2032	7,743	0.3188994	0.06317523	7,769	68,039	No
2033	23,230	0.9443297	0.18283375	23,304	68,039	No
2034	18,783	0.74885756	0.14385033	18,842	68,039	No
2035 [SS Year]	18,603	0.74222557	0.14137427	18,661	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. <https://statesummaries.ncics.org/downloads/>).

State's Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2028	94,683,042	1,117,798	43,525	137,515,492
2029	94,683,042	1,117,798	43,525	137,515,492
2030	94,683,042	1,117,798	43,525	137,515,492
2031	94,683,042	1,117,798	43,525	137,515,492
2032	94,683,042	1,117,798	43,525	137,515,492

2033	94,683,042	1,117,798	43,525	137,515,492
2034	94,683,042	1,117,798	43,525	137,515,492
2035 [SS Year]	94,683,042	1,117,798	43,525	137,515,492

U.S. Annual GHG Emissions (mton/yr)				
YEAR	CO2	CH4	N2O	CO2e
2028	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2029	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2030	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2031	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2032	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2033	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2034	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2035 [SS Year]	5,136,454,179	25,626,912	1,500,708	6,251,695,230

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (Rtba.e., global, national, and regional) and the degree (intensity) of the proposed action’s effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative’s annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action’s surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area’s ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action’s GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action’s net change in GHG emissions is compared relative to the state (where the action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action’s net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2028-2035	State Total	757,464,333	8,942,381	348,200	1,100,123,938
2028-2035	U.S. Total	41,091,633,432	205,015,293	12,005,661	50,013,561,837
2028-2035	Action	71,145	2.861889	0.582684	71,381
Percent of State Totals		0.00939256%	0.00003200%	0.00016734%	0.00648843%
Percent of U.S. Totals		0.00017314%	0.00000140%	0.00000485%	0.00014272%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00001912%.*

* Global value based on the U.S. emitting 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, <https://www.c2es.org/content/international-emissions>).

Vance AFB ROI: Alternative 2 ACAM Report

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: T-7A Recapitalization at Vance AFB - Alternative 2

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2028

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

f. Point of Contact:

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:

Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the GCR are:

applicable
 not applicable

Total reasonably foreseeable net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving “steady state” (cCba.e., no net gain/loss in emission stabilized and the action is fully implemented) emissions. The ACAM analysis uses the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the *USAF Air Emissions Guide for Air Force Stationary Sources*, the *USAF Air Emissions Guide for Air Force Mobile Sources*, and the *USAF Air Emissions Guide for Air Force Transitory Sources*.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of the proposed Action’s potential impacts to local air quality. The insignificance indicators are trivial (de minimis) rate thresholds that have been demonstrated to have little to no impact to air quality. These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold and 25 ton/yr for lead for actions occurring in areas that are "Attainment" (cCba.e., not exceeding any National Ambient Air Quality Standard (NAAQS)). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutants is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQS. For further detail on insignificance indicators, refer to *Level II, Air Quality Quantitative Assessment, Insignificance Indicators*.

The action’s net emissions for every year through achieving steady state were compared against the Insignificance Indicators and are summarized below.

Analysis Summary:

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.154	250	No
NOx	8.038	250	No
CO	12.364	250	No
SOx	0.019	250	No
PM 10	4.595	250	No
PM 2.5	0.234	250	No
Pb	0.000	25	No
NH3	0.026	250	No

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.406	250	No
NOx	3.306	250	No
CO	4.983	250	No
SOx	0.008	250	No
PM 10	0.103	250	No
PM 2.5	0.095	250	No
Pb	0.000	25	No
NH3	0.012	250	No

2030

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.001	250	No
NOx	0.014	250	No
CO	0.012	250	No
SOx	0.000	250	No
PM 10	0.001	250	No
PM 2.5	0.001	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.001	250	No
NOx	0.014	250	No
CO	0.012	250	No
SOx	0.000	250	No
PM 10	0.001	250	No
PM 2.5	0.001	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	32.936	250	No
NOx	54.773	250	No
CO	280.039	250	Yes
SOx	4.534	250	No
PM 10	6.136	250	No
PM 2.5	5.531	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2033

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	84.234	250	No
NOx	207.057	250	No
CO	198.616	250	No
SOx	10.883	250	No
PM 10	1.653	250	No
PM 2.5	1.471	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2034

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	82.165	250	No
NOx	228.556	250	No
CO	-74.952	250	No
SOx	9.321	250	No
PM 10	-5.371	250	No
PM 2.5	-4.901	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2035 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	82.028	250	No
NOx	228.514	250	No
CO	-76.697	250	No
SOx	9.320	250	No
PM 10	-5.374	250	No
PM 2.5	-4.904	250	No
Pb	0.000	25	No
NH3	0.000	250	No

The estimated annual net emissions associated with this action temporarily exceeds the insignificance indicators. However, the steady state estimated annual net emissions are below the insignificance indicators showing no significant long-term impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQs and will have an insignificant impact on air quality. No further air quality impact assessment is needed.

Carolyn Hein, Contractor

Mar 04 2026

Name, Title

Date

Vance AFB ROI: Alternative 2 ACAM Detail Report

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: T-7A Recapitalization at Vance AFB - Alternative 2

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2028

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

- Point of Contact

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:
Phone Number:

Report generated with ACAM version: 5.0.24a

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	MILCON and UMMC: Construct Hush House Pad
3.	Construction / Demolition	MILCON and UMMC: Construct T-7A Shelters
4.	Construction / Demolition	MILCON and UMMC: Addition to Egress Shop
5.	Heating	MILCON and UMMC: Addition to Egress Shop (Heating)
6.	Construction / Demolition	MILCON and UMMC: Construct Jet Blast Deflectors
7.	Construction / Demolition	FSRM: Airfield Reconfiguration
8.	Paint Booth	FSRM: Airfield Reconfiguration
9.	Construction / Demolition	FSRM: Renovate Squad Operations
10.	Construction / Demolition	FSRM: Modify Hangar
11.	Construction / Demolition	FSRM: Antenna Farm
12.	Construction / Demolition	FSRM: Remove Aboveground Service Modules of the CASS
13.	Construction / Demolition	FSRM: Munitions Storage for T-7A
14.	Construction / Demolition	FSRM: Renovate GBTS Facility
15.	Construction / Demolition	FSRM: Renovate UMT Facility
16.	Personnel	Transitional Increase of 100 Personnel
17.	Aircraft	2032 Add T-7As and LTOs
18.	Aircraft	2032 Add T-7A CPs
19.	Aircraft	2032 Add T-38C LTOs
20.	Aircraft	2032 Add T-38C CPs
21.	Aircraft	2033 Add T-7As and LTOs
22.	Aircraft	2033 Add T-7A CPs
23.	Aircraft	2033 Remove T-38Cs and LTOs
24.	Aircraft	2033 Remove T-38C CPs
25.	Aircraft	2034 Add T-7A LTOs
26.	Aircraft	2034 Add T-7A CPs
27.	Aircraft	2034 Remove T-38Cs and LTOs
28.	Aircraft	2034 Remove T-38C CPs

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct Hush House Pad

- Activity Description:

Construction of the Hush House (27,500 SF) would occur over a 2-year period from January 2028 through December 2029.

Site grading would occur on the entire site (27,500 SF). Site grading would begin in January 2028 and last approximately 4 months.

Trenching for the reinforced concrete and utilities would occur over the entire site (27,500 SF). It was assumed excavated fill would be reused in place. Trenching would begin in May 2028 and last approximately 4 months.

Construction of the new hush house pad would total approximately 27,500 square feet. Construction would include concrete mixers, rollers, and similar equipment. Construction would begin in September 2028 and last approximately 16 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 0
End Month: 2030

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.153778
SO _x	0.002670
NO _x	1.274077
CO	1.911912

Pollutant	Total Emissions (TONs)
PM 10	2.238710
PM 2.5	0.046135
Pb	0.000000
NH ₃	0.002962

- Global Scale Activity Emissions of Greenhouse Gases:

Pollutant	Total Emissions (TONs)
CH ₄	0.011710
N ₂ O	0.002915

Pollutant	Total Emissions (TONs)
CO ₂	291.192335
CO ₂ e	292.353729

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 4
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 27500
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes

Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02137	0.00427	526.92217	528.73043
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 4
 Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 27500
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.3 Building Construction Phase

2.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 9
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 16
 Number of Days: 0

2.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 27500
 Height of Building (ft): 5
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Pavers Composite	1	8
Paving Equipment Composite	1	8
Plate Compactors Composite	1	8
Rollers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Plate Compactors Composite [HP: 8] [LF: 0.43]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.54681	0.00884	4.14341	3.47054	0.16191	0.14895
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Plate Compactors Composite [HP: 8] [LF: 0.43]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02306	0.00461	568.38895	570.33952
Rollers Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02382	0.00476	587.11688	589.13172

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530

HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct T-7A Shelters

- Activity Description:

Construction of aircraft shelters (sunshades) sufficient for 68 T-7A aircraft would occur over a 2-year period from January 2028 through December 2029.

Demolition would be required for the existing T-38C shelters. Demolition would include removal of sunshades totaling approximately 210,000 square feet. Demolition would begin in January 2028 and last approximately 12 months.

Construction would include installation of sunshades totaling approximately 225,000 square feet. The height of all sunshades were assumed to be 15 feet. Construction would begin in July 2029 and last approximately 12 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.232212
SO _x	0.005138
NO _x	1.998566
CO	3.059633

Pollutant	Total Emissions (TONs)
PM 10	0.715920
PM 2.5	0.050051
Pb	0.000000
NH ₃	0.010040

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
-----------	------------------------

Pollutant	Total Emissions (TONs)
-----------	------------------------

CH ₄	0.021485
N ₂ O	0.019380

CO ₂	588.995147
CO _{2e}	595.307277

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 12
 Number of Days: 0

3.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 210000
 Height of Building to be demolished (ft): 15

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.37038	0.00743	3.34376	4.27147	0.05770	0.05308
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02330	0.00466	574.37549	576.34660
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration

Number of Month: 12
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 225000
Height of Building (ft): 15
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	7
Forklifts Composite	2	7
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18169	0.00487	1.48384	1.60558	0.06213	0.05716
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.20953	0.00487	1.95558	3.56978	0.07013	0.06452
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53409	0.00793	4.27579	2.84227	0.16774	0.15432
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17058	0.00489	1.70745	3.50145	0.04350	0.04002

Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.38855	0.00735	3.31273	4.40680	0.05338	0.04911

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02140	0.00428	527.61055	529.42117
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02138	0.00428	527.07594	528.88473
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02305	0.00461	568.31695	570.26726
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02147	0.00429	529.26401	531.08031
Welders Composite [HP: 46] [LF: 0.45]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02305	0.00461	568.30128	570.25154

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO_{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

3.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Addition to Egress Shop

- Activity Description:

Construction of the addition to the Egress Shop would occur over a 2-year period from January 2028 through December 2029.

Site grading would occur on the site of the addition, 3,200 SF. Site grading would begin in January 2028 and last approximately 1 month.

Construction of the Egress Shop addition would total approximately 3,200 SF. The height of the addition was assumed to be 20 feet. Construction would begin in February 2028 and last approximately 22 months.

Architectural coatings would be applied to the addition, totaling 3,200 square feet. Architectural coating application would begin in December 2029 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.111341
SO _x	0.002536
NO _x	0.912891
CO	1.512980

Pollutant	Total Emissions (TONs)
PM 10	0.066222
PM 2.5	0.031627
Pb	0.000000
NH ₃	0.002376

- Global Scale Activity Emissions of Greenhouse Gases:

Pollutant	Total Emissions (TONs)
CH ₄	0.011467
N ₂ O	0.002625

Pollutant	Total Emissions (TONs)
CO ₂	284.182210
CO ₂ e	285.250971

4.1 Site Grading Phase

4.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

4.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 3200
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02137	0.00427	526.92217	528.73043

Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO_{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)

HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4.2 Building Construction Phase

4.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 2
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 22
Number of Days: 0

4.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 3200
Height of Building (ft): 20
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

4.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843

HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

- CEE_{POL}: Construction Exhaust Emissions (TONs)
- NE: Number of Equipment
- WD: Number of Total Work Days (days)
- H: Hours Worked per Day (hours)
- HP: Equipment Horsepower
- LF: Equipment Load Factor
- EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
- 0.002205: Conversion Factor grams to pounds
- 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

- VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
- BA: Area of Building (ft²)
- BH: Height of Building (ft)
- (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
- HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL}: Vehicle Emissions (TONs)
- VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL}: Emission Factor for Pollutant (grams/mile)
- VM: Worker Trips On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- WD: Number of Total Work Days (days)
- WT: Average Worker Round Trip Commute (mile)
- 1.25: Conversion Factor Number of Construction Equipment to Number of Works
- NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 BA : Area of Building (ft²)
 BH : Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT : Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

4.3 Architectural Coatings Phase

4.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2029

- Phase Duration

Number of Month: 1
Number of Days: 0

4.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 1
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
--	------	------	------	------	------	------	----

POVs	50.00	50.00	0	0	0	0	0
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4.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

1: Conversion Factor man days to trips (1 trip / 1 man * day)

WT: Average Worker Round Trip Commute (mile)

PA: Paint Area (ft²)

800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)

BA: Area of Building (ft²)

2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)

0.0116: Emission Factor (lb/ft²)

2000: Conversion Factor pounds to tons

5. Heating

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Addition to Egress Shop (Heating)

- Activity Description:

Heating/cooling for the new addition would begin following the construction period, or approximately January 2030. Heating/cooling would be required as follows:

Addition to the Egress Shop – 3,200 SF

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000795
SO _x	0.000087
NO _x	0.014461
CO	0.012147

Pollutant	Emissions Per Year (TONs)
PM 10	0.001099
PM 2.5	0.001099
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.000327
N ₂ O	0.000327

Pollutant	Emissions Per Year (TONs)
CO ₂	17.355890
CO ₂ e	17.373822

5.2 Heating Assumptions

- Heating

Heating Calculation Type: Heat Energy Requirement Method

- Heat Energy Requirement Method

Area of floorspace to be heated (ft²): 3200

Type of fuel: Natural Gas

Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)

Heat Value (MMBtu/ft³): 0.00105

Energy Intensity (MMBtu/ft²): 0.0949

- Default Settings Used: Yes

- Boiler/Furnace Usage

Operating Time Per Year (hours): 900 (default)

5.3 Heating Emission Factor(s)

- Heating Criteria Pollutant Emission Factors (lb/1000000 scf)

VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃
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5.5	0.6	100	84	7.6	7.6		
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- Heating Greenhouse Gasses Pollutant Emission Factors (lb/1000000 scf)

CH ₄	N ₂ O	CO ₂	CO ₂ e
2.26	2.26	120019	120143

5.4 Heating Formula(s)

- Heating Fuel Consumption ft³ per Year

$$FC_{HER} = HA * EI / HV / 1000000$$

FC_{HER}: Fuel Consumption for Heat Energy Requirement Method

HA: Area of floorspace to be heated (ft²)

EI: Energy Intensity Requirement (MMBtu/ft²)

HV: Heat Value (MMBTU/ft³)

1000000: Conversion Factor

- Heating Emissions per Year

$$HE_{POL} = FC * EF_{POL} / 2000$$

HE_{POL}: Heating Emission Emissions (TONs)

FC: Fuel Consumption

EF_{POL}: Emission Factor for Pollutant

2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct Jet Blast Deflectors

- Activity Description:

Construction of the jet blast deflectors would occur over a 2-year period from January 2028 through December 2029.

Construction of the deflectors would total approximately 48,000 square feet. The height of the deflectors was assumed to be 12 feet. Construction would begin in January 2028 and last approximately 24 months.

- Activity Start Date

Start Month: 1

Start Month: 2028

- Activity End Date

Indefinite: False

End Month: 0

End Month: 2030

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.286027

Pollutant	Total Emissions (TONs)
PM 10	0.067021

SO _x	0.005741
NO _x	2.261351
CO	3.314160

PM 2.5	0.061639
Pb	0.000000
NH ₃	0.005484

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.022750
N ₂ O	0.006502

Pollutant	Total Emissions (TONs)
CO ₂	568.951781
CO ₂ e	571.457766

6.1 Building Construction Phase

6.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 24
 Number of Days: 0

6.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 48000
 Height of Building (ft): 12
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

6.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
--	-----------------	------------------	-----------------	-------------------

LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

6.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONS)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Airfield Reconfiguration

- Activity Description:

Airfield reconfiguration would include airfield markings, installation of mooring and anchor rods, and relocation of the compass rose and trim pad. Activities would occur over a 1-year period starting in January 2028 (painting activities would occur from September through December 2028 and are captured in a separate Paint Booth activity).

Trenching/excavation for the mooring and anchor rods was estimated to occur on 100 SF. Excavation of the existing of the existing compass rose and trim pad (and access road) would be required (approx. 30,000 SF). Excavation would begin in January 2028 and last approximately 2 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

The construction activity as used to characterize removal of existing airfield markings. Grinders would likely be used to remove existing paint, estimated at 50,000 SF. Paint removal would begin in March 2028 and last approximately 3 months.

Paving would be required for the relocated compass rose and trim pad (approx. 30,000 SF). Paving would begin in June 2028 and last approximately 3 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 11
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.047361
SO _x	0.000830
NO _x	0.370542
CO	0.577895

Pollutant	Total Emissions (TONs)
PM 10	0.609917
PM 2.5	0.010162
Pb	0.000000
NH ₃	0.001156

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.003301
N ₂ O	0.000867

Pollutant	Total Emissions (TONs)
CO ₂	82.279880
CO ₂ e	82.620532

7.1 Trenching/Excavating Phase

7.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 2
 Number of Days: 0

7.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 30100
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)

WD: Number of Total Work Days (days)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)

HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

7.2 Building Construction Phase

7.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 3
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 3
 Number of Days: 0

7.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 30000
 Height of Building (ft): 1
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	2	8
Generator Sets Composite	1	8
Pressure Washers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

7.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.37038	0.00743	3.34376	4.27147	0.05770	0.05308
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Pressure Washers Composite [HP: 14] [LF: 0.3]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.52107	0.00857	4.30894	3.24344	0.17290	0.15907

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02330	0.00466	574.37549	576.34660
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Pressure Washers Composite [HP: 14] [LF: 0.3]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02345	0.00469	578.03386	580.01752

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.3 Paving Phase

7.3.1 Paving Phase Timeline Assumptions

- Phase Start Date

Start Month: 6
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 3

Number of Days: 0

7.3.2 Paving Phase Assumptions

- General Paving Information

Paving Area (ft²): 30000

- Paving Default Settings

Default Settings Used: No

Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	1	8
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.3.3 Paving Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Rollers Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02382	0.00476	587.11688	589.13172
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.3.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 PA: Paving Area (ft²)
 0.25: Thickness of Paving Area (ft)
 (1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_P = (2.62 * PA) / 43560 / 2000$$

VOC_P: Paving VOC Emissions (TONs)
 2.62: Emission Factor (lb/acre)
 PA: Paving Area (ft²)
 43560: Conversion Factor square feet to acre (43560 ft² / acre)² / acre)
 2000: Conversion Factor square pounds to TONs (2000 lb / TON)

8. Paint Booth

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** FSRM: Airfield Reconfiguration

- **Activity Description:**

Painting activities would be a continuation of the airfield reconfiguration construction activity. Painting was estimated at 150 gallons. Asphalt/Concrete Paint would be used (TT-P-1952E Type III used as surrogate to estimate for VOC content). Painting would begin in September 2028 and last approximately 4 months.

- **Activity Start Date**

Start Month: 9
Start Year: 2028

- **Activity End Date**

Indefinite: No
End Month: 12
End Year: 2028

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Total Emissions (TONs)
VOC	0.009498
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Total Emissions (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Total Emissions (TONs)
CH ₄	0.000000
N ₂ O	0.000000

Pollutant	Total Emissions (TONs)
CO ₂	0.000000
CO ₂ e	0.000000

8.2 Paint Booth Assumptions

- **Paint Booth**

Coating throughput (gallons/year): 150

- **Default Settings Used:** No

- **Paint Booth Consumption**

Coating used: Asphalt/Concrete Paint (TT-P-1952E Type III used as surrogate)
Specific gravity of coating: 1.4
Coating VOC content by weight (%): 6.5
Efficiency of control device (%): 50

8.3 Paint Booth Formula(s)

- **Paint Booth Emissions per Year**

$$PBE_{VOC} = (VOC / 100) * CT * SG * 8.35 * (1 - (CD / 100)) / 2000$$

PBE_{VOC}: Paint Booth VOC Emissions (TONs per Year)

VOC: Coating VOC content by weight (%)

(VOC / 100): Conversion Factor percent to decimal

CT: Coating throughput (gallons/year)

SG: Specific gravity of coating

8.35: Conversion Factor the density of water

CD: Efficiency of control device (%)

(1 - (CD / 100)): Conversion Factor percent to decimal (Not effected by control device)

2000: Conversion Factor pounds to tons

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate Squad Operations

- Activity Description:

Squadron Operations Buildings Renovations (i.e., Buildings 179, 183, 541, and 690) would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the buildings (Building 179 = approximately 25,000 SF; Building 183 = approximately 26,000 SF; Building 541 = approximately 20,000 SF; Building 690 = approximately 27,000 SF) would be construction to equate the renovations (98,000 SF * 0.25 = 24,500 SF). The height of the buildings was assumed to be 30 feet. Renovations would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (98,000 square feet) following the renovations. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1

Start Month: 2028

- Activity End Date

Indefinite: False

End Month: 12

End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.268596
SO _x	0.002665
NO _x	1.051974
CO	1.530178

Pollutant	Total Emissions (TONs)
PM 10	0.030950
PM 2.5	0.028465
Pb	0.000000
NH ₃	0.003075

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.010622
N ₂ O	0.004360

Pollutant	Total Emissions (TONs)
CO ₂	270.846073
CO ₂ e	272.410715

9.1 Building Construction Phase

9.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1

Start Quarter: 1

Start Year: 2028

- Phase Duration

Number of Month: 11

Number of Days: 0

9.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 24500
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

9.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

9.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

9.2 Architectural Coatings Phase

9.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 1
 Number of Days: 0

9.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 98000
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

9.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

9.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft²)
800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft²)
2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
0.0116: Emission Factor (lb/ft²)
2000: Conversion Factor pounds to tons

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Modify Hangar

- Activity Description:

Modification of Building 199 would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the hangar (Building 199 = approximately 50,000 SF) would be construction to equate the renovations (50,000 SF * 0.25 = 12,500 SF). The height of the hangars was assumed to be 30 feet. Renovations would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (50,000 SF) following the renovations. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.716278
SO _x	0.002882
NO _x	1.151333
CO	1.601794

Pollutant	Total Emissions (TONs)
PM 10	0.032436
PM 2.5	0.029832
Pb	0.000000
NH ₃	0.006668

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.011873
N ₂ O	0.013192

Pollutant	Total Emissions (TONs)
CO ₂	335.348551
CO ₂ e	339.576543

10.1 Building Construction Phase

10.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 11
 Number of Days: 0

10.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 125000
 Height of Building (ft): 30
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

10.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

10.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

10.2 Architectural Coatings Phase

10.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 1
 Number of Days: 0

10.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 50000
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

10.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃

LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

10.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 1: Conversion Factor man days to trips (1 trip / 1 man * day)
- WT: Average Worker Round Trip Commute (mile)
- PA: Paint Area (ft²)
- 800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL}: Vehicle Emissions (TONs)
- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL}: Emission Factor for Pollutant (grams/mile)
- VM: Worker Trips On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

- VOC_{AC}: Architectural Coating VOC Emissions (TONs)
- BA: Area of Building (ft²)
- 2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
- 0.0116: Emission Factor (lb/ft²)
- 2000: Conversion Factor pounds to tons

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

- Activity Location

- County: Garfield
- Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** FSRM: Antenna Farm

- **Activity Description:**

Construction of the antenna farm near Building 199 would occur over a 1-year period starting in January 2028.

It was assumed approximately 5,000 square feet would be trenched and excavated for installation of the antenna farm. Trenching/excavation would begin in January 2028 and last approximately 12 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

- **Activity Start Date**

Start Month: 1
Start Year: 2028

- **Activity End Date**

Indefinite: False
End Month: 12
End Year: 2028

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	0.052824
SO _x	0.000887
NO _x	0.431647
CO	0.739787

Pollutant	Total Emissions (TONs)
PM 10	0.607823
PM 2.5	0.010065
Pb	0.000000
NH ₃	0.001199

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Total Emissions (TONs)
CH ₄	0.004061
N ₂ O	0.000891

Pollutant	Total Emissions (TONs)
CO ₂	100.548713
CO ₂ e	100.915511

11.1 Trenching/Excavating Phase

11.1.1 Trenching / Excavating Phase Timeline Assumptions

- **Phase Start Date**

Start Month: 1
Start Quarter: 1
Start Year: 2028

- **Phase Duration**

Number of Month: 12
Number of Days: 0

11.1.2 Trenching / Excavating Phase Assumptions

- **General Trenching/Excavating Information**

Area of Site to be Trenched/Excavated (ft²): 5000
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- **Trenching Default Settings**

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- **Construction Exhaust (default)**

Equipment Name	Number Of Equipment	Hours Per Day
----------------	---------------------	---------------

Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

11.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134

LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

11.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VE} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Remove Aboveground Service Modules of the CASS

- Activity Description:

Removal of T-39C CASS modules would occur over a 1-year period starting in January 2028.

It was assumed approximately 1,000 SF would be excavated and filled for CASS removal. Excavation would begin in January 2028 and last approximately 12 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.052824
SO _x	0.000887
NO _x	0.431647
CO	0.739787

Pollutant	Total Emissions (TONs)
PM 10	0.130321
PM 2.5	0.010065
Pb	0.000000
NH ₃	0.001199

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.004061
N ₂ O	0.000891

Pollutant	Total Emissions (TONs)
CO ₂	100.548713
CO ₂ e	100.915511

12.1 Trenching/Excavating Phase

12.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1

Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 12
 Number of Days: 0

12.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 1000
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

12.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}

Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

12.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM_{10FD} = (20 * ACRE * WD) / 2000$$

PM_{10FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Munitions Storage for T-7A

- Activity Description:

Construction of the concrete pad for munitions storage would occur over a 1-year period starting in January 2028.

Site grading would occur on the entire site (3,600 SF). Site grading would begin in January 2028 and last approximately 2 months.

Trenching for the concrete pad would occur over the entire site (3,600 SF). It was assumed excavated fill would be reused in place. Trenching would begin in March 2028 and last approximately 2 months.

Construction of the pad would total approximately 3,600 square feet. Construction would include concrete mixers, rollers, and similar equipment. Construction would begin in May 2028 and last approximately 8 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.077814
SO _x	0.001361
NO _x	0.646896
CO	0.975428

Pollutant	Total Emissions (TONs)
PM 10	0.168659
PM 2.5	0.023370
Pb	0.000000
NH ₃	0.001421

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005965
N ₂ O	0.001335

Pollutant	Total Emissions (TONs)
CO ₂	147.742739
CO ₂ e	148.289697

13.1 Site Grading Phase

13.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 2
Number of Days: 0

13.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 3600
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02137	0.00427	526.92217	528.73043
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002

HDTV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM_{10FD} = (20 * ACRE * WD) / 2000$$

PM_{10FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

13.2 Trenching/Excavating Phase

13.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 3
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 2
Number of Days: 0

13.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 3600
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)

WD: Number of Total Work Days (days)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

13.3 Building Construction Phase

13.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 8

Number of Days: 0

13.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial

Area of Building (ft²): 3600

Height of Building (ft): 5

Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No

Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Pavers Composite	1	8
Paving Equipment Composite	1	9
Plate Compactors Composite	1	8
Rollers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

13.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699

Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Plate Compactors Composite [HP: 8] [LF: 0.43]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.54681	0.00884	4.14341	3.47054	0.16191	0.14895
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Plate Compactors Composite [HP: 8] [LF: 0.43]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02306	0.00461	568.38895	570.33952
Rollers Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02382	0.00476	587.11688	589.13172

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

14. Construction / Demolition

14.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate GBTS Facility

- Activity Description:

GBTS facility renovations (Building 672) would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the building (approximately 27,000 SF) would be construction to equate the renovations (27,000 SF * 0.25 = 6,750 SF). The height of the building was assumed to be 30 feet. Renovation would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (27,000 square feet) following the renovation. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.362774
SO _x	0.001176
NO _x	0.408308
CO	0.692829

Pollutant	Total Emissions (TONs)
PM 10	0.014832
PM 2.5	0.013641
Pb	0.000000
NH ₃	0.001341

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005341
N ₂ O	0.001716

Pollutant	Total Emissions (TONs)
CO ₂	134.296221
CO ₂ e	134.941034

14.1 Building Construction Phase

14.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 11

Number of Days: 0

14.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 6750
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

14.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO_{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

14.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 WD : Number of Total Work Days (days)
 WT : Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE : Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 BA : Area of Building (ft²)
 BH : Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT : Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

14.2 Architectural Coatings Phase

14.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

14.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 27000
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

14.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

14.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 1: Conversion Factor man days to trips (1 trip / 1 man * day)
 WT: Average Worker Round Trip Commute (mile)
 PA: Paint Area (ft²)
 800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
 $VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
 BA: Area of Building (ft²)
 2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
 0.0116: Emission Factor (lb/ft²)
 2000: Conversion Factor pounds to tons

15. Construction / Demolition

15.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate UMT Facility

- Activity Description:

UMT facility renovations would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the building (approximately 12,000 SF) would be construction to equate the renovations (12,000 SF * 0.25 = 3,000 SF). The height of the building was assumed to be 30 feet. Renovation would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (12,000 square feet) following the renovation. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.188607
SO _x	0.001168
NO _x	0.404600
CO	0.690157

Pollutant	Total Emissions (TONs)
PM 10	0.014776
PM 2.5	0.013590
Pb	0.000000
NH ₃	0.001207

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005294
N ₂ O	0.001387

Pollutant	Total Emissions (TONs)
CO ₂	131.889412
CO ₂ e	132.434846

15.1 Building Construction Phase

15.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 11
 Number of Days: 0

15.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 3000
 Height of Building (ft): 30
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

15.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

15.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

15.2 Architectural Coatings Phase

15.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 1
 Number of Days: 0

15.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 12000
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

15.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

15.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 1: Conversion Factor man days to trips (1 trip / 1 man * day)
 WT: Average Worker Round Trip Commute (mile)

PA: Paint Area (ft²)

800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)

BA: Area of Building (ft²)

2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)

0.0116: Emission Factor (lb/ft²)

2000: Conversion Factor pounds to tons

16. Personnel

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Transitional Increase of 100 Personnel

- Activity Description:

Increase of 100 personnel during the T-7A and T-38C transition period (i.e., 2032 through 2034). Assumed all personnel commute daily.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: No

End Month: 12

End Year: 2034

- Activity Emissions of Criteria Pollutants:

Pollutant	Total Emissions (TONs)
VOC	0.409993
SO _x	0.003005
NO _x	0.124758
CO	5.234423

Pollutant	Total Emissions (TONs)
PM 10	0.008724
PM 2.5	0.007714
Pb	0.000000
NH ₃	0.065363

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
-----------	------------------------

Pollutant	Total Emissions (TONs)
-----------	------------------------

CH ₄	0.021932
N ₂ O	0.008188

CO ₂	595.161765
CO _{2e}	598.146855

16.2 Personnel Assumptions

- Number of Personnel

Active Duty Personnel:	100
Civilian Personnel:	0
Support Contractor Personnel:	0
Air National Guard (ANG) Personnel:	0
Reserve Personnel:	0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule

Active Duty Personnel:	5 Days Per Week (default)
Civilian Personnel:	5 Days Per Week (default)
Support Contractor Personnel:	5 Days Per Week (default)
Air National Guard (ANG) Personnel:	4 Days Per Week (default)
Reserve Personnel:	4 Days Per Month (default)

16.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

16.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.27401	0.00192	0.08002	3.26598	0.01846	0.00655	0.04266
LDGT	0.20829	0.00258	0.11094	2.94852	0.01931	0.00714	0.03597
HDGV	0.53636	0.00582	0.33268	6.74281	0.04022	0.01923	0.08091
LDDV	0.10489	0.00121	0.14594	6.81082	0.02151	0.00818	0.01655
LDDT	0.08795	0.00116	0.14309	2.36609	0.01868	0.00677	0.01516
HDDV	0.06534	0.00394	1.43715	1.30874	0.11975	0.04718	0.06930
MC	2.41491	0.00283	0.65152	11.08874	0.02922	0.02059	0.05712

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01175	0.00448	271.98834	273.50441
LDGT	0.01197	0.00603	364.95167	366.88528
HDGV	0.03303	0.01988	825.01800	831.21040
LDDV	0.05557	0.00065	360.25469	361.98343
LDDT	0.02891	0.00094	345.63221	346.69024
HDDV	0.02446	0.17008	1177.21662	1222.97273
MC	0.09040	0.00267	394.35934	397.59777

16.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$$VMT_p = NP * WD * AC$$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
 NP: Number of Personnel
 WD: Work Days per Year
 AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$$

VMT_{Total}: Total Vehicle Miles Travel (miles)
 VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
 VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
 VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
 VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
 VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

$$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{Total}: Total Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Personnel On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-7As and LTOs

- Activity Description:

In 2032, add 24 T-7As and 2,740 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 1,808 CPs.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	25.117621
SO _x	3.075973
NO _x	42.332418
CO	198.748893

PM 10	4.227908
PM 2.5	3.819052
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.374980
N ₂ O	0.072521

Pollutant	Emissions Per Year (TONs)
CO ₂	9094.707871
CO ₂ e	9124.433327

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	24.487847
SO _x	2.916944
NO _x	38.821421
CO	194.719278

Pollutant	Emissions Per Year (TONs)
PM 10	3.788064
PM 2.5	3.399040
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.360716
N ₂ O	0.069708

Pollutant	Emissions Per Year (TONs)
CO ₂	8750.708637
CO ₂ e	8779.270916

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.303368
SO _x	0.069219
NO _x	1.014204
CO	3.491011

Pollutant	Emissions Per Year (TONs)
PM 10	0.074669
PM 2.5	0.066940
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008714
N ₂ O	0.001700

Pollutant	Emissions Per Year (TONs)
CO ₂	207.231174
CO ₂ e	207.925675

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.326406
SO _x	0.089810
NO _x	2.496793
CO	0.538603

Pollutant	Emissions Per Year (TONs)
PM 10	0.365175
PM 2.5	0.353073
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005550
N ₂ O	0.001113

Pollutant	Emissions Per Year (TONs)
CO ₂	136.768059
CO ₂ e	137.236736

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	2740
Number of Annual Trim Test(s) per Aircraft:	15

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

17.4 Auxiliary Power Unit (APU)

17.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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4501687C	211.0	0.0	0.0	740.4	740.7
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17.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

- APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
- APU: Number of Auxiliary Power Units
- OH: Operation Hours for Each LTO (hour)
- LTO: Number of LTOs
- EF_{POL}: Emission Factor for Pollutant (lb/hr)
- 2000: Conversion Factor pounds to tons

17.5 Aircraft Engine Test Cell

17.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: No

- Annual Run-ups / Test Durations

- Annual Run-ups (Per Aircraft Engine):** 1
- Idle Duration (mins):** 12
- Approach Duration (mins):** 27
- Intermediate Duration (mins):** 9
- Military Duration (mins):** 9
- After Burner Duration (mins):** 3

17.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

17.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$$

- TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Total Number of Engines (For All Aircraft)
- ARU: Annual Run-ups (Per Aircraft Engine)
- 2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$$

- TestCell: Aircraft Engine Test Cell Emissions (TONs)
- TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
- TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
 TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
 TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

17.6 Aerospace Ground Equipment (AGE)

17.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 2740

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

17.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

17.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-7A CPs

- Activity Description:

In 2032, add 4,261 T-7A CPs not within an LTO.

1,808 CPs within an LTO + 4,261 CPs not within an LTO = 6,069 CPs in 2032.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.250397
SO _x	0.717397
NO _x	11.117917
CO	2.167339

Pollutant	Emissions Per Year (TONs)
PM 10	0.079781
PM 2.5	0.068285
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.090312
N ₂ O	0.017620

Pollutant	Emissions Per Year (TONs)
CO ₂	2147.793756
CO ₂ e	2154.991732

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.250397
SO _x	0.717397
NO _x	11.117917
CO	2.167339

Pollutant	Emissions Per Year (TONs)
PM 10	0.079781
PM 2.5	0.068285
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.090312
N ₂ O	0.017620

Pollutant	Emissions Per Year (TONs)
CO ₂	2147.793756
CO ₂ e	2154.991732

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 24
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 4261
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.22
Climb Out [Intermediate] (mins): 1.38
Takeoff [Military] (mins): 0.38
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

18.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-38C LTOs

- Activity Description:

In 2032, increase T-38C LTOs by 1,857.

Includes 1,226 CPs

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	5.604126
SO _x	0.539328
NO _x	1.073957
CO	62.517609

Pollutant	Emissions Per Year (TONs)
PM 10	1.468808
PM 2.5	1.321252
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.067895
N ₂ O	0.013246

Pollutant	Emissions Per Year (TONs)
CO ₂	1614.676574
CO ₂ e	1620.087896

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	5.604126
SO _x	0.539328
NO _x	1.073957
CO	62.517609

Pollutant	Emissions Per Year (TONs)
PM 10	1.468808
PM 2.5	1.321252
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.067895
N ₂ O	0.013246

Pollutant	Emissions Per Year (TONs)
CO ₂	1614.676574
CO ₂ e	1620.087896

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01

After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23
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- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	1857
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

19.4 Auxiliary Power Unit (APU)

19.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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19.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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19.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-38C CPs

- Activity Description:

In 2032, increase T-38C CPs by 2,888.

1,226 CPs within an LTO + 2,888 CPs not within an LTO = 4,114 CPs in 2032

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.826211
SO _x	0.200471
NO _x	0.192531
CO	14.848258

Pollutant	Emissions Per Year (TONs)
PM 10	0.355289
PM 2.5	0.318796
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.025237
N ₂ O	0.004924

Pollutant	Emissions Per Year (TONs)
CO ₂	600.182522
CO ₂ e	602.193934

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.826211
SO _x	0.200471
NO _x	0.192531
CO	14.848258

Pollutant	Emissions Per Year (TONs)
PM 10	0.355289
PM 2.5	0.318796
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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CH ₄	0.025237
N ₂ O	0.004924

CO ₂	600.182522
CO ₂ e	602.193934

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 2888
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.27
Climb Out [Intermediate] (mins): 1.42
Takeoff [Military] (mins): 0.39
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Add T-7As and LTOs

- Activity Description:

In 2033, add 44 T-7As and 13,396 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 8,842 CPs.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	93.073380
SO _x	8.843677
NO _x	120.099359
CO	464.447122

Pollutant	Emissions Per Year (TONs)
PM 10	9.597090
PM 2.5	8.728325
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	1.053430
N ₂ O	0.202406

Pollutant	Emissions Per Year (TONs)
CO ₂	25917.731925
CO ₂ e	26000.904801

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU part)]:

Pollutant	Emissions Per Year (TONs)
VOC	90.921389
SO _x	8.277689
NO _x	106.033038
CO	455.413676

Pollutant	Emissions Per Year (TONs)
PM 10	7.674837
PM 2.5	6.879411
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU part)]:

Pollutant	Emissions Per Year (TONs)
CH ₄	1.010322
N ₂ O	0.193847

Pollutant	Emissions Per Year (TONs)
CO ₂	24869.142077
CO ₂ e	24948.750315

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.556174
SO _x	0.126901
NO _x	1.859374
CO	6.400188

Pollutant	Emissions Per Year (TONs)
PM 10	0.136894
PM 2.5	0.122723
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015975
N ₂ O	0.003117

Pollutant	Emissions Per Year (TONs)
CO ₂	379.923820
CO ₂ e	381.197071

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.595817
SO _x	0.439087
NO _x	12.206947
CO	2.633258

Pollutant	Emissions Per Year (TONs)
PM 10	1.785360
PM 2.5	1.726191
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.027133
N ₂ O	0.005442

Pollutant	Emissions Per Year (TONs)
CO ₂	668.666029
CO ₂ e	670.957414

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 44
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 13396
Number of Annual Trim Test(s) per Aircraft: 15

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

21.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

21.4 Auxiliary Power Unit (APU)

21.4.1 Auxiliary Power Unit (APU) Assumptions

- **Default Settings Used:** Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
4501687C	211.0	0.0	0.0	740.4	740.7

21.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL} : Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)

APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL} : Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

21.5 Aircraft Engine Test Cell

21.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 44

- **Default Settings Used:** No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	1
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

21.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

21.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$\text{TestCellPS}_{\text{POL}} = (\text{TD} / 60) * (\text{FC} / 1000) * \text{EF} * \text{NE} * \text{ARU} / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$\text{TestCell} = \text{TestCellPS}_{\text{IDLE}} + \text{TestCellPS}_{\text{APPROACH}} + \text{TestCellPS}_{\text{INTERMEDIATE}} + \text{TestCellPS}_{\text{MILITARY}} + \text{TestCellPS}_{\text{AFTERBURN}}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

21.6 Aerospace Ground Equipment (AGE)

21.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 13396

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

21.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

21.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Add T-7A CPs

- Activity Description:

In 2033, add 20,831 T-7A CPs not included within an LTO.

8,842 CPs within an LTO + 20,831 CPs not within an LTO = 29,673 CPs in 2033.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	6.112890
SO _x	3.507182
NO _x	54.352814
CO	10.595598

Pollutant	Emissions Per Year (TONs)
PM 10	0.390032
PM 2.5	0.333827
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.441512
N ₂ O	0.086139

Pollutant	Emissions Per Year (TONs)
CO ₂	10500.044998
CO ₂ e	10535.234164

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	6.112890
SO _x	3.507182
NO _x	54.352814
CO	10.595598

Pollutant	Emissions Per Year (TONs)
PM 10	0.390032
PM 2.5	0.333827
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.441512
N ₂ O	0.086139

Pollutant	Emissions Per Year (TONs)
CO ₂	10500.044998
CO ₂ e	10535.234164

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 44
Flight Operation Cycle Type: CP (Close Pattern)

Number of Annual Flight Operation Cycles for all Aircraft: 20831
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	2.22
Climb Out [Intermediate] (mins):	1.38
Takeoff [Military] (mins):	0.38
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

22.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Remove T-38Cs and LTOs

- Activity Description:

By 2033, remove 14 T-38Cs and 12,406 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 8,190 CPs

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-42.369654
SO _x	-4.663375
NO _x	-20.881794
CO	-457.283711

Pollutant	Emissions Per Year (TONs)
PM 10	-12.096367
PM 2.5	-10.992955
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.560999
N ₂ O	-0.109589

Pollutant	Emissions Per Year (TONs)
CO ₂	-13363.364837
CO ₂ e	-13408.196680

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-40.573574
SO _x	-4.198931
NO _x	-9.429248
CO	-450.798263

Pollutant	Emissions Per Year (TONs)
PM 10	-10.359448
PM 2.5	-9.319309
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.528594
N ₂ O	-0.103129

Pollutant	Emissions Per Year (TONs)
CO ₂	-12571.050440
CO ₂ e	-12613.180239

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.318199
SO _x	-0.057806
NO _x	-0.147725
CO	-4.046794

Pollutant	Emissions Per Year (TONs)
PM 10	-0.083502
PM 2.5	-0.075024
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007277
N ₂ O	-0.001420

Pollutant	Emissions Per Year (TONs)
CO ₂	-173.064565
CO ₂ e	-173.644562

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.477882
SO _x	-0.406637
NO _x	-11.304821
CO	-2.438654

Pollutant	Emissions Per Year (TONs)
PM 10	-1.653417
PM 2.5	-1.598621
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.025128
N ₂ O	-0.005040

Pollutant	Emissions Per Year (TONs)
CO ₂	-619.249832
CO ₂ e	-621.371878

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	12406
Number of Annual Trim Test(s) per Aircraft:	17

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23.4 Auxiliary Power Unit (APU)

23.4.1 Auxiliary Power Unit (APU) Assumptions

- **Default Settings Used:** Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

23.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}

23.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

- APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
- APU: Number of Auxiliary Power Units
- OH: Operation Hours for Each LTO (hour)
- LTO: Number of LTOs
- EF_{POL}: Emission Factor for Pollutant (lb/hr)
- 2000: Conversion Factor pounds to tons

23.5 Aircraft Engine Test Cell

23.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 28

- Default Settings Used: No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	3
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

23.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

23.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$$

- TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Total Number of Engines (For All Aircraft)
- ARU: Annual Run-ups (Per Aircraft Engine)
- 2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$$

- TestCell: Aircraft Engine Test Cell Emissions (TONs)
- TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
- TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
- TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
- TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

23.6 Aerospace Ground Equipment (AGE)

23.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 12406

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

23.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

23.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Remove T-38C CPs

- Activity Description:

By 2033, remove 19,291 T-38C CPs not within an LTO.

8,190 CPs within an LTO + 19,291 CPs not within an LTO = 27,481 CPs in 2033

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-5.518852
SO _x	-1.339085
NO _x	-1.286048
CO	-99.182047

Pollutant	Emissions Per Year (TONs)
PM 10	-2.373230
PM 2.5	-2.129466
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.168575
N ₂ O	-0.032889

Pollutant	Emissions Per Year (TONs)
CO ₂	-4009.044675
CO ₂ e	-4022.480326

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-5.518852
SO _x	-1.339085
NO _x	-1.286048
CO	-99.182047

Pollutant	Emissions Per Year (TONs)
PM 10	-2.373230
PM 2.5	-2.129466
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.168575
N ₂ O	-0.032889

Pollutant	Emissions Per Year (TONs)
CO ₂	-4009.044675
CO ₂ e	-4022.480326

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R
 Primary Function: Trainer
 Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 19291
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.27
Climb Out [Intermediate] (mins): 1.42
Takeoff [Military] (mins): 0.39
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034 Add T-7A LTOs

- **Activity Description:**

In 2034, add 4,567 T-7A LTOs.

Includes 3,014 CPs.

- **Activity Start Date**

Start Month: 1

Start Year: 2034

- **Activity End Date**

Indefinite: Yes

End Month: N/A

End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	25.106137
SO _x	1.598191
NO _x	19.015160
CO	53.689250

Pollutant	Emissions Per Year (TONs)
PM 10	0.398219
PM 2.5	0.353373
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.190372
N ₂ O	0.036028

Pollutant	Emissions Per Year (TONs)
CO ₂	4814.373783
CO ₂ e	4829.234476

- **Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:**

Pollutant	Emissions Per Year (TONs)
VOC	25.106137
SO _x	1.598191
NO _x	19.015160
CO	53.689250

Pollutant	Emissions Per Year (TONs)
PM 10	0.398219
PM 2.5	0.353373
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.190372
N ₂ O	0.036028

Pollutant	Emissions Per Year (TONs)
CO ₂	4814.373783
CO ₂ e	4829.234476

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	4567
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25.4 Auxiliary Power Unit (APU)

25.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

25.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
4501687C	211.0	0.0	0.0	740.4	740.7

25.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)

APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Add T-7A CPs

- Activity Description:

In 2034, add 7,102 T-7A CPs not within an LTO.

3,014 CPs within an LTO + 7,102 CPs not within an LTO = 10,116 CPs in 2034.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	2.084093
SO _x	1.195718
NO _x	18.530732
CO	3.612402

Pollutant	Emissions Per Year (TONs)
PM 10	0.132975
PM 2.5	0.113813
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.150526
N ₂ O	0.029368

Pollutant	Emissions Per Year (TONs)
CO ₂	3579.824280
CO ₂ e	3591.821470

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.084093
SO _x	1.195718
NO _x	18.530732
CO	3.612402

Pollutant	Emissions Per Year (TONs)
PM 10	0.132975
PM 2.5	0.113813
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	0.150526	CO ₂	3579.824280
N ₂ O	0.029368	CO ₂ e	3591.821470

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 7102
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.22
Climb Out [Intermediate] (mins): 1.38
Takeoff [Military] (mins): 0.38
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0

AfterBurn (mins): 0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Remove T-38Cs and LTOs

- Activity Description:

By 2034, remove 49 T-38Cs and 4,795 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 3,163 CPs

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-27.125385
SO _x	-3.837617
NO _x	-15.550259
CO	-292.520520

Pollutant	Emissions Per Year (TONs)
PM 10	-6.637855
PM 2.5	-6.015729
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.473036
N ₂ O	-0.092343

Pollutant	Emissions Per Year (TONs)
CO ₂	-11258.126075
CO ₂ e	-11295.873888

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-25.440478
SO _x	-3.478127
NO _x	-10.663834
CO	-277.414186

Pollutant	Emissions Per Year (TONs)
PM 10	-5.706540
PM 2.5	-5.135266
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.437854
N ₂ O	-0.085425

Pollutant	Emissions Per Year (TONs)
CO ₂	-10413.055996
CO ₂ e	-10447.953633

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.113696
SO _x	-0.202322
NO _x	-0.517038
CO	-14.163779

Pollutant	Emissions Per Year (TONs)
PM 10	-0.292259
PM 2.5	-0.262586
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.025470
N ₂ O	-0.004969

Pollutant	Emissions Per Year (TONs)
CO ₂	-605.725976
CO _{2e}	-607.755967

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.571211
SO _x	-0.157168
NO _x	-4.369387
CO	-0.942556

Pollutant	Emissions Per Year (TONs)
PM 10	-0.639057
PM 2.5	-0.617878
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.009712
N ₂ O	-0.001948

Pollutant	Emissions Per Year (TONs)
CO ₂	-239.344103
CO _{2e}	-240.164288

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:

Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	4795
Number of Annual Trim Test(s) per Aircraft:	17

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27.4 Auxiliary Power Unit (APU)

27.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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27.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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27.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

27.5 Aircraft Engine Test Cell

27.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 98

- **Default Settings Used:** No

- **Annual Run-ups / Test Durations**

Annual Run-ups (Per Aircraft Engine): 3
Idle Duration (mins): 12
Approach Duration (mins): 27
Intermediate Duration (mins): 9
Military Duration (mins): 9
After Burner Duration (mins): 3

27.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

27.5.3 Aircraft Engine Test Cell Formula(s)

- **Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)**

$$\text{TestCellPS}_{\text{POL}} = (\text{TD} / 60) * (\text{FC} / 1000) * \text{EF} * \text{NE} * \text{ARU} / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONs

- **Aircraft Engine Test Cell Emissions per Year**

$$\text{TestCell} = \text{TestCellPS}_{\text{IDLE}} + \text{TestCellPS}_{\text{APPROACH}} + \text{TestCellPS}_{\text{INTERMEDIATE}} + \text{TestCellPS}_{\text{MILITARY}} + \text{TestCellPS}_{\text{AFTERBURN}}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

27.6 Aerospace Ground Equipment (AGE)

27.6.1 Aerospace Ground Equipment (AGE) Assumptions

- **Default Settings Used:** Yes

- **AGE Usage**

Number of Annual LTO (Landing and Take-off) cycles for AGE: 4795

- **Aerospace Ground Equipment (AGE) (default)**

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

27.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

27.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Remove T-38C CPs

- Activity Description:

By 2034, remove 7,459 T-38C CPs not within an LTO.

3,163 CPs within an LTO + 7,459 CPs not within an LTO = 10,622 CPs in 2034

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-2.133903
SO _x	-0.517766
NO _x	-0.497259
CO	-38.349432

Pollutant	Emissions Per Year (TONs)
PM 10	-0.917626
PM 2.5	-0.823373
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.065181
N ₂ O	-0.012717

Pollutant	Emissions Per Year (TONs)
CO ₂	-1550.125148
CO ₂ e	-1555.320137

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-2.133903
SO _x	-0.517766
NO _x	-0.497259
CO	-38.349432

Pollutant	Emissions Per Year (TONs)
PM 10	-0.917626
PM 2.5	-0.823373
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.065181
N ₂ O	-0.012717

Pollutant	Emissions Per Year (TONs)
CO ₂	-1550.125148
CO ₂ e	-1555.320137

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

28.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
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Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	7459
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	2.27
Climb Out [Intermediate] (mins):	1.42
Takeoff [Military] (mins):	0.39
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

28.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

Vance AFB ROI: Alternative 2 GHG Report

AIR CONFORMITY APPLICABILITY MODEL REPORT GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to estimate GHG emissions associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the GHG emissions analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: T-7A Recapitalization at Vance AFB - Alternative 2

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2028

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

f. Point of Contact:

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:

Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action's start through the action's "steady state" (SS, net gain/loss in emission stabilized and the action is fully implemented) of emissions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO₂ equivalents (CO₂e). The CO₂e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO₂. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO₂e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO₂e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO₂e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected steady state of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	CO₂	CH₄	N₂O	CO₂e	Threshold	Exceedance
2028	1,929	0.07514998	0.03421646	1,942	68,039	No
2029	826	0.03183392	0.01664124	831	68,039	No
2030	16	0.00029648	0.00029648	16	68,039	No
2031	16	0.00029648	0.00029648	16	68,039	No
2032	12,404	0.51352124	0.10103026	12,445	68,039	No
2033	29,682	1.20785139	0.23354045	29,777	68,039	No
2034	25,677	1.02884782	0.1975582	25,758	68,039	No
2035 [SS Year]	25,497	1.02221583	0.19508213	25,578	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. <https://statesummaries.ncics.org/downloads/>).

State's Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2028	94,683,042	1,117,798	43,525	137,515,492
2029	94,683,042	1,117,798	43,525	137,515,492
2030	94,683,042	1,117,798	43,525	137,515,492
2031	94,683,042	1,117,798	43,525	137,515,492
2032	94,683,042	1,117,798	43,525	137,515,492

2033	94,683,042	1,117,798	43,525	137,515,492
2034	94,683,042	1,117,798	43,525	137,515,492
2035 [SS Year]	94,683,042	1,117,798	43,525	137,515,492

U.S. Annual GHG Emissions (mton/yr)				
YEAR	CO2	CH4	N2O	CO2e
2028	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2029	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2030	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2031	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2032	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2033	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2034	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2035 [SS Year]	5,136,454,179	25,626,912	1,500,708	6,251,695,230

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (Rtba.e., global, national, and regional) and the degree (intensity) of the proposed action’s effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative’s annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action’s surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area’s ambient air quality relative to meeting the NAAQs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action’s GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action’s net change in GHG emissions is compared relative to the state (where the action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action’s net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2028-2035	State Total	757,464,333	8,942,381	348,200	1,100,123,938
2028-2035	U.S. Total	41,091,633,432	205,015,293	12,005,661	50,013,561,837
2028-2035	Action	96,047	3.880013	0.778662	96,363
Percent of State Totals		0.01268006%	0.00004339%	0.00022362%	0.00875927%
Percent of U.S. Totals		0.00023374%	0.00000189%	0.00000649%	0.00019267%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00002582%.*

* Global value based on the U.S. emitting 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, <https://www.c2es.org/content/international-emissions>).

Vance AFB ROI: Alternative 3 ACAM Report

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: T-7A Recapitalization at Vance AFB - Alternative 3

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2028

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

f. Point of Contact:

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:

Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the GCR are:

applicable
 not applicable

Total reasonably foreseeable net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving “steady state” (cCba.e., no net gain/loss in emission stabilized and the action is fully implemented) emissions. The ACAM analysis uses the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the *USAF Air Emissions Guide for Air Force Stationary Sources*, the *USAF Air Emissions Guide for Air Force Mobile Sources*, and the *USAF Air Emissions Guide for Air Force Transitory Sources*.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of the proposed Action’s potential impacts to local air quality. The insignificance indicators are trivial (de minimis) rate thresholds that have been demonstrated to have little to no impact to air quality. These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold and 25 ton/yr for lead for actions occurring in areas that are "Attainment" (cCba.e., not exceeding any National Ambient Air Quality Standard (NAAQS)). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutants is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQS. For further detail on insignificance indicators, refer to *Level II, Air Quality Quantitative Assessment, Insignificance Indicators*.

The action’s net emissions for every year through achieving steady state were compared against the Insignificance Indicators and are summarized below.

Analysis Summary:

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.154	250	No
NOx	8.038	250	No
CO	12.364	250	No
SOx	0.019	250	No
PM 10	4.595	250	No
PM 2.5	0.234	250	No
Pb	0.000	25	No
NH3	0.026	250	No

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.408	250	No
NOx	3.351	250	No
CO	5.018	250	No
SOx	0.009	250	No
PM 10	0.103	250	No
PM 2.5	0.095	250	No
Pb	0.000	25	No
NH3	0.014	250	No

2030

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.001	250	No
NOx	0.014	250	No
CO	0.012	250	No
SOx	0.000	250	No
PM 10	0.001	250	No
PM 2.5	0.001	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.001	250	No
NOx	0.014	250	No
CO	0.012	250	No
SOx	0.000	250	No
PM 10	0.001	250	No
PM 2.5	0.001	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	15.183	250	No
NOx	40.113	250	No
CO	86.403	250	No
SOx	2.288	250	No
PM 10	1.674	250	No
PM 2.5	1.516	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2033

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	57.168	250	No
NOx	164.221	250	No
CO	18.781	250	No
SOx	7.430	250	No
PM 10	-1.938	250	No
PM 2.5	-1.754	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2034

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	99.363	250	No
NOx	263.540	250	Yes
CO	-8.246	250	No
SOx	11.539	250	No
PM 10	-2.950	250	No
PM 2.5	-2.637	250	No
Pb	0.000	25	No
NH3	0.022	250	No

2035

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	105.752	250	No
NOx	272.510	250	Yes
CO	3.761	250	No
SOx	12.209	250	No
PM 10	-2.825	250	No
PM 2.5	-2.528	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2036 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	105.752	250	No
NOx	272.510	250	Yes
CO	3.761	250	No
SOx	12.209	250	No
PM 10	-2.825	250	No
PM 2.5	-2.528	250	No
Pb	0.000	25	No
NH3	0.000	250	No

The steady state estimated annual net emissions associated with this action exceed the insignificance indicators, indicating a potential for a significant impact to air quality. Therefore, the ACAM analysis is inconclusive and further air quality impact assessment is needed.

Carolyn Hein, Contractor

Mar 05 2026

Name, Title

Date

Vance AFB ROI: Alternative 3 ACAM Detail Report

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: T-7A Recapitalization at Vance AFB - Alternative 3

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2028

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

- Point of Contact

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:
Phone Number:

Report generated with ACAM version: 5.0.24a

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	MILCON and UMMC: Construct Hush House Pad
3.	Construction / Demolition	MILCON and UMMC: Construct T-7A Shelters
4.	Construction / Demolition	MILCON and UMMC: Addition to Egress Shop
5.	Heating	MILCON and UMMC: Addition to Egress Shop (Heating)
6.	Construction / Demolition	MILCON and UMMC: Construct Jet Blast Deflectors
7.	Construction / Demolition	FSRM: Airfield Reconfiguration
8.	Paint Booth	FSRM: Airfield Reconfiguration
9.	Construction / Demolition	FSRM: Renovate Squad Operations
10.	Construction / Demolition	FSRM: Modify Hangar
11.	Construction / Demolition	FSRM: Antenna Farm
12.	Construction / Demolition	FSRM: Remove Aboveground Service Modules of the CASS
13.	Construction / Demolition	FSRM: Munitions Storage for T-7A
14.	Construction / Demolition	FSRM: Renovate GBTS Facility
15.	Construction / Demolition	FSRM: Renovate UMT Facility
16.	Personnel	Transitional Increase of 100 Personnel
17.	Aircraft	2032 Add T-7As and LTOs
18.	Aircraft	2032 Add T-7A CPs
19.	Aircraft	2032 Remove T-38C LTOs
20.	Aircraft	2032 Remove T-38C CPs
21.	Aircraft	2033 Add T-7As and LTOs
22.	Aircraft	2033 Add T-7A CPs
23.	Aircraft	2033 Remove T-38Cs and LTOs
24.	Aircraft	2033 Remove T-38C CPs
25.	Aircraft	2034 Add T-7As and LTOs
26.	Aircraft	2034 Add T-7A CPs
27.	Aircraft	2034 Remove T-38Cs and LTOs
28.	Aircraft	2034 Remove T-38C CPs
29.	Aircraft	2035 Add T-7As LTOs
30.	Aircraft	2035 Add T-7A CPs

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct Hush House Pad

- Activity Description:

Construction of the Hush House (27,500 SF) would occur over a 2-year period from January 2028 through December 2029.

Site grading would occur on the entire site (27,500 SF). Site grading would begin in January 2028 and last approximately 4 months.

Trenching for the reinforced concrete and utilities would occur over the entire site (27,500 SF). It was assumed excavated fill would be reused in place. Trenching would begin in May 2028 and last approximately 4 months.

Construction of the new hush house pad would total approximately 27,500 square feet. Construction would include concrete mixers, rollers, and similar equipment. Construction would begin in September 2028 and last approximately 16 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 0
End Month: 2030

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.153778
SO _x	0.002670
NO _x	1.274077
CO	1.911912

Pollutant	Total Emissions (TONs)
PM 10	2.238710
PM 2.5	0.046135
Pb	0.000000
NH ₃	0.002962

- Global Scale Activity Emissions of Greenhouse Gases:

Pollutant	Total Emissions (TONs)
CH ₄	0.011710
N ₂ O	0.002915

Pollutant	Total Emissions (TONs)
CO ₂	291.192335
CO ₂ e	292.353729

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 4
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 27500
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes

Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02137	0.00427	526.92217	528.73043
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 4
 Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 27500
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.3 Building Construction Phase

2.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 9
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 16
 Number of Days: 0

2.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 27500
 Height of Building (ft): 5
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Pavers Composite	1	8
Paving Equipment Composite	1	8
Plate Compactors Composite	1	8
Rollers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Plate Compactors Composite [HP: 8] [LF: 0.43]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.54681	0.00884	4.14341	3.47054	0.16191	0.14895
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Plate Compactors Composite [HP: 8] [LF: 0.43]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02306	0.00461	568.38895	570.33952
Rollers Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02382	0.00476	587.11688	589.13172

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530

HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

2.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct T-7A Shelters

- Activity Description:

Construction of aircraft shelters (sunshades) sufficient for 99 T-7A aircraft would occur over a 2-year period from January 2028 through December 2029.

Demolition would be required for the existing T-38C shelters. Demolition would include removal of sunshades totaling approximately 210,000 square feet. Demolition would begin in January 2028 and last approximately 12 months.

Construction would include installation of sunshades totaling approximately 325,000 square feet. The height of all sunshades were assumed to be 15 feet. Construction would begin in July 2029 and last approximately 12 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.234288
SO _x	0.005243
NO _x	2.043500
CO	3.094590

Pollutant	Total Emissions (TONs)
PM 10	0.716567
PM 2.5	0.050646
Pb	0.000000
NH ₃	0.011836

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
-----------	------------------------

Pollutant	Total Emissions (TONs)
-----------	------------------------

CH ₄	0.022103
N ₂ O	0.023790

CO ₂	620.594835
CO _{2e}	628.236609

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 12
 Number of Days: 0

3.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 210000
 Height of Building to be demolished (ft): 15

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.37038	0.00743	3.34376	4.27147	0.05770	0.05308
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02330	0.00466	574.37549	576.34660
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building being demolish (ft²)
 BH: Height of Building being demolish (ft)
 (1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
 0.25: Volume reduction factor (material reduced by 75% to account for air space)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration

Number of Month: 12
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 325000
Height of Building (ft): 15
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	7
Forklifts Composite	2	7
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18169	0.00487	1.48384	1.60558	0.06213	0.05716
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.20953	0.00487	1.95558	3.56978	0.07013	0.06452
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53409	0.00793	4.27579	2.84227	0.16774	0.15432
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17058	0.00489	1.70745	3.50145	0.04350	0.04002

Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.38855	0.00735	3.31273	4.40680	0.05338	0.04911

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02140	0.00428	527.61055	529.42117
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02138	0.00428	527.07594	528.88473
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02305	0.00461	568.31695	570.26726
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02147	0.00429	529.26401	531.08031
Welders Composite [HP: 46] [LF: 0.45]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02305	0.00461	568.30128	570.25154

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

3.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Addition to Egress Shop

- Activity Description:

Construction of the addition to the Egress Shop would occur over a 2-year period from January 2028 through December 2029.

Site grading would occur on the site of the addition, 3,200 SF. Site grading would begin in January 2028 and last approximately 1 month.

Construction of the Egress Shop addition would total approximately 3,200 SF. The height of the addition was assumed to be 20 feet. Construction would begin in February 2028 and last approximately 22 months.

Architectural coatings would be applied to the addition, totaling 3,200 square feet. Architectural coating application would begin in December 2029 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.111341
SO _x	0.002536
NO _x	0.912891
CO	1.512980

Pollutant	Total Emissions (TONs)
PM 10	0.066222
PM 2.5	0.031627
Pb	0.000000
NH ₃	0.002376

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.011467
N ₂ O	0.002625

Pollutant	Total Emissions (TONs)
CO ₂	284.182210
CO ₂ e	285.250971

4.1 Site Grading Phase

4.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

4.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 3200
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02137	0.00427	526.92217	528.73043

Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO_{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)

HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

4.2 Building Construction Phase

4.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 2
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 22
 Number of Days: 0

4.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 3200
 Height of Building (ft): 20
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

4.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843

HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 BA : Area of Building (ft²)
 BH : Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT : Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM : Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

4.3 Architectural Coatings Phase

4.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2029

- Phase Duration

Number of Month: 1
Number of Days: 0

4.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 1
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
--	------	------	------	------	------	------	----

POVs	50.00	50.00	0	0	0	0	0
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4.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

4.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

1: Conversion Factor man days to trips (1 trip / 1 man * day)

WT: Average Worker Round Trip Commute (mile)

PA: Paint Area (ft²)

800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)

BA: Area of Building (ft²)

2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)

0.0116: Emission Factor (lb/ft²)

2000: Conversion Factor pounds to tons

5. Heating

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Addition to Egress Shop (Heating)

- Activity Description:

Heating/cooling for the new addition would begin following the construction period, or approximately January 2030. Heating/cooling would be required as follows:

Addition to the Egress Shop – 3,200 SF

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000795
SO _x	0.000087
NO _x	0.014461
CO	0.012147

Pollutant	Emissions Per Year (TONs)
PM 10	0.001099
PM 2.5	0.001099
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.000327
N ₂ O	0.000327

Pollutant	Emissions Per Year (TONs)
CO ₂	17.355890
CO ₂ e	17.373822

5.2 Heating Assumptions

- Heating

Heating Calculation Type: Heat Energy Requirement Method

- Heat Energy Requirement Method

Area of floorspace to be heated (ft²): 3200

Type of fuel: Natural Gas

Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)

Heat Value (MMBtu/ft³): 0.00105

Energy Intensity (MMBtu/ft²): 0.0949

- Default Settings Used: Yes

- Boiler/Furnace Usage

Operating Time Per Year (hours): 900 (default)

5.3 Heating Emission Factor(s)

- Heating Criteria Pollutant Emission Factors (lb/1000000 scf)

VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃
-----	-----------------	-----------------	----	-------	--------	----	-----------------

5.5	0.6	100	84	7.6	7.6		
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- Heating Greenhouse Gasses Pollutant Emission Factors (lb/1000000 scf)

CH ₄	N ₂ O	CO ₂	CO ₂ e
2.26	2.26	120019	120143

5.4 Heating Formula(s)

- Heating Fuel Consumption ft³ per Year

$$FC_{HER} = HA * EI / HV / 1000000$$

FC_{HER}: Fuel Consumption for Heat Energy Requirement Method

HA: Area of floorspace to be heated (ft²)

EI: Energy Intensity Requirement (MMBtu/ft²)

HV: Heat Value (MMBTU/ft³)

1000000: Conversion Factor

- Heating Emissions per Year

$$HE_{POL} = FC * EF_{POL} / 2000$$

HE_{POL}: Heating Emission Emissions (TONs)

FC: Fuel Consumption

EF_{POL}: Emission Factor for Pollutant

2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: MILCON and UMMC: Construct Jet Blast Deflectors

- Activity Description:

Construction of the jet blast deflectors would occur over a 2-year period from January 2028 through December 2029.

Construction of the deflectors would total approximately 48,000 square feet. The height of the deflectors was assumed to be 12 feet. Construction would begin in January 2028 and last approximately 24 months.

- Activity Start Date

Start Month: 1

Start Month: 2028

- Activity End Date

Indefinite: False

End Month: 0

End Month: 2030

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.286027

Pollutant	Total Emissions (TONs)
PM 10	0.067021

SO _x	0.005741
NO _x	2.261351
CO	3.314160

PM 2.5	0.061639
Pb	0.000000
NH ₃	0.005484

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.022750
N ₂ O	0.006502

Pollutant	Total Emissions (TONs)
CO ₂	568.951781
CO ₂ e	571.457766

6.1 Building Construction Phase

6.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 24
 Number of Days: 0

6.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 48000
 Height of Building (ft): 12
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

6.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
--	-----------------	------------------	-----------------	-------------------

LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

6.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Airfield Reconfiguration

- Activity Description:

Airfield reconfiguration would include airfield markings, installation of mooring and anchor rods, and relocation of the compass rose and trim pad. Activities would occur over a 1-year period starting in January 2028 (painting activities would occur from September through December 2028 and are captured in a separate Paint Booth activity).

Trenching/excavation for the mooring and anchor rods was estimated to occur on 100 SF. Excavation of the existing of the existing compass rose and trim pad (and access road) would be required (approx. 30,000 SF). Excavation would begin in January 2028 and last approximately 2 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

The construction activity as used to characterize removal of existing airfield markings. Grinders would likely be used to remove existing paint, estimated at 50,000 SF. Paint removal would begin in March 2028 and last approximately 3 months.

Paving would be required for the relocated compass rose and trim pad (approx. 30,000 SF). Paving would begin in June 2028 and last approximately 3 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 11
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.047361
SO _x	0.000830
NO _x	0.370542
CO	0.577895

Pollutant	Total Emissions (TONs)
PM 10	0.609917
PM 2.5	0.010162
Pb	0.000000
NH ₃	0.001156

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.003301
N ₂ O	0.000867

Pollutant	Total Emissions (TONs)
CO ₂	82.279880
CO ₂ e	82.620532

7.1 Trenching/Excavating Phase

7.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 2
 Number of Days: 0

7.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 30100
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)

WD: Number of Total Work Days (days)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)

HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

7.2 Building Construction Phase

7.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 3
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 3
 Number of Days: 0

7.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 30000
 Height of Building (ft): 1
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	2	8
Generator Sets Composite	1	8
Pressure Washers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

7.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.37038	0.00743	3.34376	4.27147	0.05770	0.05308
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Pressure Washers Composite [HP: 14] [LF: 0.3]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.52107	0.00857	4.30894	3.24344	0.17290	0.15907

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02330	0.00466	574.37549	576.34660
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Pressure Washers Composite [HP: 14] [LF: 0.3]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02345	0.00469	578.03386	580.01752

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

7.3 Paving Phase

7.3.1 Paving Phase Timeline Assumptions

- Phase Start Date

Start Month: 6
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 3

Number of Days: 0

7.3.2 Paving Phase Assumptions

- General Paving Information

Paving Area (ft²): 30000

- Paving Default Settings

Default Settings Used: No

Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	1	8
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.3.3 Paving Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Rollers Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02382	0.00476	587.11688	589.13172
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

7.3.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 PA: Paving Area (ft²)
 0.25: Thickness of Paving Area (ft)
 (1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_P = (2.62 * PA) / 43560 / 2000$$

VOC_P: Paving VOC Emissions (TONs)
 2.62: Emission Factor (lb/acre)
 PA: Paving Area (ft²)
 43560: Conversion Factor square feet to acre (43560 ft² / acre)² / acre)
 2000: Conversion Factor square pounds to TONs (2000 lb / TON)

8. Paint Booth

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** FSRM: Airfield Reconfiguration

- **Activity Description:**

Painting activities would be a continuation of the airfield reconfiguration construction activity. Painting was estimated at 150 gallons. Asphalt/Concrete Paint would be used (TT-P-1952E Type III used as surrogate to estimate for VOC content). Painting would begin in September 2028 and last approximately 4 months.

- **Activity Start Date**

Start Month: 9
Start Year: 2028

- **Activity End Date**

Indefinite: No
End Month: 12
End Year: 2028

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Total Emissions (TONs)
VOC	0.009498
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Total Emissions (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Total Emissions (TONs)
CH ₄	0.000000
N ₂ O	0.000000

Pollutant	Total Emissions (TONs)
CO ₂	0.000000
CO ₂ e	0.000000

8.2 Paint Booth Assumptions

- **Paint Booth**

Coating throughput (gallons/year): 150

- **Default Settings Used:** No

- **Paint Booth Consumption**

Coating used: Asphalt/Concrete Paint (TT-P-1952E Type III used as surrogate)
Specific gravity of coating: 1.4
Coating VOC content by weight (%): 6.5
Efficiency of control device (%): 50

8.3 Paint Booth Formula(s)

- **Paint Booth Emissions per Year**

$$PBE_{VOC} = (VOC / 100) * CT * SG * 8.35 * (1 - (CD / 100)) / 2000$$

PBE_{VOC}: Paint Booth VOC Emissions (TONs per Year)

VOC: Coating VOC content by weight (%)

(VOC / 100): Conversion Factor percent to decimal

CT: Coating throughput (gallons/year)

SG: Specific gravity of coating

8.35: Conversion Factor the density of water

CD: Efficiency of control device (%)

(1 - (CD / 100)): Conversion Factor percent to decimal (Not effected by control device)

2000: Conversion Factor pounds to tons

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate Squad Operations

- Activity Description:

Squadron Operations Buildings Renovations (i.e., Buildings 179, 183, 541, and 690) would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the buildings (Building 179 = approximately 25,000 SF; Building 183 = approximately 26,000 SF; Building 541 = approximately 20,000 SF; Building 690 = approximately 27,000 SF) would be construction to equate the renovations (98,000 SF * 0.25 = 24,500 SF). The height of the buildings was assumed to be 30 feet. Renovations would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (98,000 square feet) following the renovations. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1

Start Month: 2028

- Activity End Date

Indefinite: False

End Month: 12

End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.268596
SO _x	0.002665
NO _x	1.051974
CO	1.530178

Pollutant	Total Emissions (TONs)
PM 10	0.030950
PM 2.5	0.028465
Pb	0.000000
NH ₃	0.003075

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.010622
N ₂ O	0.004360

Pollutant	Total Emissions (TONs)
CO ₂	270.846073
CO ₂ e	272.410715

9.1 Building Construction Phase

9.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1

Start Quarter: 1

Start Year: 2028

- Phase Duration

Number of Month: 11

Number of Days: 0

9.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 24500
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

9.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

9.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

9.2 Architectural Coatings Phase

9.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 1
 Number of Days: 0

9.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 98000
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

9.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

9.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft²)
800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft²)
2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
0.0116: Emission Factor (lb/ft²)
2000: Conversion Factor pounds to tons

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Modify Hangar

- Activity Description:

Modification of Building 199 would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the hangar (Building 199 = approximately 50,000 SF) would be construction to equate the renovations (50,000 SF * 0.25 = 12,500 SF). The height of the hangars was assumed to be 30 feet. Renovations would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (50,000 SF) following the renovations. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.716278
SO _x	0.002882
NO _x	1.151333
CO	1.601794

Pollutant	Total Emissions (TONs)
PM 10	0.032436
PM 2.5	0.029832
Pb	0.000000
NH ₃	0.006668

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.011873
N ₂ O	0.013192

Pollutant	Total Emissions (TONs)
CO ₂	335.348551
CO ₂ e	339.576543

10.1 Building Construction Phase

10.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 11
 Number of Days: 0

10.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 125000
 Height of Building (ft): 30
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDTV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

10.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Generator Sets Composite [HP: 14] [LF: 0.74]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.53548	0.00793	4.28855	2.84630	0.16952	0.15596
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404
Welders Composite [HP: 46] [LF: 0.45]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40942	0.00735	3.37086	4.43151	0.06385	0.05874

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Generator Sets Composite [HP: 14] [LF: 0.74]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.29959	570.24985
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277
Welders Composite [HP: 46] [LF: 0.45]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02305	0.00461	568.30744	570.25772

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO_{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

10.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

10.2 Architectural Coatings Phase

10.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 1
 Number of Days: 0

10.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 50000
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

10.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃

LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

10.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 1: Conversion Factor man days to trips (1 trip / 1 man * day)
- WT: Average Worker Round Trip Commute (mile)
- PA: Paint Area (ft²)
- 800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL}: Vehicle Emissions (TONs)
- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL}: Emission Factor for Pollutant (grams/mile)
- VM: Worker Trips On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

- VOC_{AC}: Architectural Coating VOC Emissions (TONs)
- BA: Area of Building (ft²)
- 2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
- 0.0116: Emission Factor (lb/ft²)
- 2000: Conversion Factor pounds to tons

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

- Activity Location

- County: Garfield
- Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** FSRM: Antenna Farm

- **Activity Description:**

Construction of the antenna farm near Building 199 would occur over a 1-year period starting in January 2028.

It was assumed approximately 5,000 square feet would be trenched and excavated for installation of the antenna farm. Trenching/excavation would begin in January 2028 and last approximately 12 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

- **Activity Start Date**

Start Month: 1
Start Year: 2028

- **Activity End Date**

Indefinite: False
End Month: 12
End Year: 2028

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	0.052824
SO _x	0.000887
NO _x	0.431647
CO	0.739787

Pollutant	Total Emissions (TONs)
PM 10	0.607823
PM 2.5	0.010065
Pb	0.000000
NH ₃	0.001199

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Total Emissions (TONs)
CH ₄	0.004061
N ₂ O	0.000891

Pollutant	Total Emissions (TONs)
CO ₂	100.548713
CO ₂ e	100.915511

11.1 Trenching/Excavating Phase

11.1.1 Trenching / Excavating Phase Timeline Assumptions

- **Phase Start Date**

Start Month: 1
Start Quarter: 1
Start Year: 2028

- **Phase Duration**

Number of Month: 12
Number of Days: 0

11.1.2 Trenching / Excavating Phase Assumptions

- **General Trenching/Excavating Information**

Area of Site to be Trenched/Excavated (ft²): 5000
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- **Trenching Default Settings**

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- **Construction Exhaust (default)**

Equipment Name	Number Of Equipment	Hours Per Day
----------------	---------------------	---------------

Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

11.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134

LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

11.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VE} : Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Remove Aboveground Service Modules of the CASS

- Activity Description:

Removal of T-39C CASS modules would occur over a 1-year period starting in January 2028.

It was assumed approximately 1,000 SF would be excavated and filled for CASS removal. Excavation would begin in January 2028 and last approximately 12 months. Assumed no materials are required to be hauled on- or off-site; excavated spoils will be used on-site.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.052824
SO _x	0.000887
NO _x	0.431647
CO	0.739787

Pollutant	Total Emissions (TONs)
PM 10	0.130321
PM 2.5	0.010065
Pb	0.000000
NH ₃	0.001199

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.004061
N ₂ O	0.000891

Pollutant	Total Emissions (TONs)
CO ₂	100.548713
CO ₂ e	100.915511

12.1 Trenching/Excavating Phase

12.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1

Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 12
 Number of Days: 0

12.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 1000
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

12.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH ₄	N ₂ O	CO ₂	CO _{2e}

Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

12.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Munitions Storage for T-7A

- Activity Description:

Construction of the concrete pad for munitions storage would occur over a 1-year period starting in January 2028.

Site grading would occur on the entire site (3,600 SF). Site grading would begin in January 2028 and last approximately 2 months.

Trenching for the concrete pad would occur over the entire site (3,600 SF). It was assumed excavated fill would be reused in place. Trenching would begin in March 2028 and last approximately 2 months.

Construction of the pad would total approximately 3,600 square feet. Construction would include concrete mixers, rollers, and similar equipment. Construction would begin in May 2028 and last approximately 8 months.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.077814
SO _x	0.001361
NO _x	0.646896
CO	0.975428

Pollutant	Total Emissions (TONs)
PM 10	0.168659
PM 2.5	0.023370
Pb	0.000000
NH ₃	0.001421

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005965
N ₂ O	0.001335

Pollutant	Total Emissions (TONs)
CO ₂	147.742739
CO ₂ e	148.289697

13.1 Site Grading Phase

13.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 2
Number of Days: 0

13.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 3600
Amount of Material to be Hauled On-Site (yd³): 0
Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.28126	0.00491	2.08618	3.41790	0.11550	0.10626
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.24470	0.00487	2.43300	3.48645	0.12364	0.11375
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.34206	0.00492	3.04082	2.66346	0.13374	0.12304
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Graders Composite [HP: 148] [LF: 0.41]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02155	0.00431	531.33158	533.15497
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02137	0.00427	526.92217	528.73043
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02162	0.00432	532.85820	534.68684
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH ₄	N ₂ O	CO ₂	CO ₂ e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002

HDTV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM_{10FD} = (20 * ACRE * WD) / 2000$$

PM_{10FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL} : Vehicle Emissions (TONs)
- VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL} : Emission Factor for Pollutant (grams/mile)
- VM: Worker Trips On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

13.2 Trenching/Excavating Phase

13.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

- Start Month:** 3
- Start Quarter:** 1
- Start Year:** 2028

- Phase Duration

- Number of Month:** 2
- Number of Days:** 0

13.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

- Area of Site to be Trenched/Excavated (ft²):** 3600
- Amount of Material to be Hauled On-Site (yd³):** 0
- Amount of Material to be Hauled Off-Site (yd³):** 0

- Trenching Default Settings

- Default Settings Used:** Yes
- Average Day(s) worked per week:** 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

- Average Hauling Truck Capacity (yd³):** 20 (default)
- Average Hauling Truck Round Trip Commute (mile):** 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

- Average Worker Round Trip Commute (mile):** 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)

WD: Number of Total Work Days (days)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

13.3 Building Construction Phase

13.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 8

Number of Days: 0

13.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial

Area of Building (ft²): 3600

Height of Building (ft): 5

Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No

Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Pavers Composite	1	8
Paving Equipment Composite	1	9
Plate Compactors Composite	1	8
Rollers Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

13.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.55275	0.00855	4.19697	3.25556	0.16292	0.14989
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21588	0.00486	2.33827	3.43520	0.10542	0.09699

Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.16337	0.00488	1.88314	3.37709	0.05778	0.05316
Plate Compactors Composite [HP: 8] [LF: 0.43]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.54681	0.00884	4.14341	3.47054	0.16191	0.14895
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.50057	0.00542	3.50905	4.08429	0.13206	0.12150

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02314	0.00463	570.33256	572.28980
Pavers Composite [HP: 81] [LF: 0.42]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02133	0.00427	525.89644	527.70118
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.90982	529.72147
Plate Compactors Composite [HP: 8] [LF: 0.43]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02306	0.00461	568.38895	570.33952
Rollers Composite [HP: 36] [LF: 0.38]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02382	0.00476	587.11688	589.13172

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

13.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

14. Construction / Demolition

14.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate GBTS Facility

- Activity Description:

GBTS facility renovations (Building 672) would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the building (approximately 27,000 SF) would be construction to equate the renovations (27,000 SF * 0.25 = 6,750 SF). The height of the building was assumed to be 30 feet. Renovation would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (27,000 square feet) following the renovation. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
Start Month: 2028

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.362774
SO _x	0.001176
NO _x	0.408308
CO	0.692829

Pollutant	Total Emissions (TONs)
PM 10	0.014832
PM 2.5	0.013641
Pb	0.000000
NH ₃	0.001341

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005341
N ₂ O	0.001716

Pollutant	Total Emissions (TONs)
CO ₂	134.296221
CO ₂ e	134.941034

14.1 Building Construction Phase

14.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 11

Number of Days: 0

14.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 6750
 Height of Building (ft): 30
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

14.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO_{2e}
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO_{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

14.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft²)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)
 VMT_{VT} : Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
 EF_{POL} : Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

14.2 Architectural Coatings Phase

14.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 1
Number of Days: 0

14.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
Total Square Footage (ft²): 27000
Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

14.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

14.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 1: Conversion Factor man days to trips (1 trip / 1 man * day)
 WT: Average Worker Round Trip Commute (mile)
 PA: Paint Area (ft²)
 800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
 $VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
 BA: Area of Building (ft²)
 2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
 0.0116: Emission Factor (lb/ft²)
 2000: Conversion Factor pounds to tons

15. Construction / Demolition

15.1 General Information & Timeline Assumptions

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FSRM: Renovate UMT Facility

- Activity Description:

UMT facility renovations would occur over a 1-year period starting in January 2028.

It was assumed 25 percent of the total square footage of the building (approximately 12,000 SF) would be construction to equate the renovations (12,000 SF * 0.25 = 3,000 SF). The height of the building was assumed to be 30 feet. Renovation would begin in January 2028 and last approximately 11 months.

It was assumed architectural coatings would be required for the entire facility (12,000 square feet) following the renovation. Architectural coating application would begin in December 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 1
 Start Month: 2028

- Activity End Date

Indefinite: False
 End Month: 12
 End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.188607
SO _x	0.001168
NO _x	0.404600
CO	0.690157

Pollutant	Total Emissions (TONs)
PM 10	0.014776
PM 2.5	0.013590
Pb	0.000000
NH ₃	0.001207

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH ₄	0.005294
N ₂ O	0.001387

Pollutant	Total Emissions (TONs)
CO ₂	131.889412
CO ₂ e	132.434846

15.1 Building Construction Phase

15.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 11
 Number of Days: 0

15.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
 Area of Building (ft²): 3000
 Height of Building (ft): 30
 Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

15.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

Emission Factors	0.18743	0.00487	1.60126	1.62784	0.06620	0.06090
Forklifts Composite [HP: 82] [LF: 0.2]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.21591	0.00487	2.03219	3.56543	0.07876	0.07246
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cranes Composite [HP: 367] [LF: 0.29]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02141	0.00428	527.75405	529.56516
Forklifts Composite [HP: 82] [LF: 0.2]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02138	0.00428	527.02495	528.83357
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH₄	N₂O	CO₂	CO₂e
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH₄	N₂O	CO₂	CO₂e
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

15.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

15.2 Architectural Coatings Phase

15.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 12
 Start Quarter: 1
 Start Year: 2028

- Phase Duration

Number of Month: 1
 Number of Days: 0

15.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 12000
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

15.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.28709	0.00213	0.10369	3.82985	0.01983	0.00682	0.04561
LDGT	0.22184	0.00274	0.14835	3.44816	0.02038	0.00748	0.03843
HDGV	0.65217	0.00591	0.50140	8.29899	0.04361	0.02133	0.08181
LDDV	0.10491	0.00123	0.14433	6.06749	0.02070	0.00710	0.01637
LDDT	0.10150	0.00122	0.16924	2.71089	0.01924	0.00712	0.01575
HDDV	0.09220	0.00413	2.05600	1.42734	0.13567	0.06142	0.06778
MC	2.47820	0.00283	0.65580	11.43307	0.02958	0.02060	0.05621

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01406	0.00478	301.99197	303.65134
LDGT	0.01415	0.00644	387.59603	389.70002
HDGV	0.04049	0.02163	837.81111	844.67718
LDDV	0.05504	0.00065	364.18864	365.90284
LDDT	0.03005	0.00094	363.64583	364.73530
HDDV	0.02501	0.16681	1230.36534	1275.27057
MC	0.09383	0.00267	394.21362	397.54948

15.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 1: Conversion Factor man days to trips (1 trip / 1 man * day)
 WT: Average Worker Round Trip Commute (mile)

PA: Paint Area (ft²)

800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)

BA: Area of Building (ft²)

2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)

0.0116: Emission Factor (lb/ft²)

2000: Conversion Factor pounds to tons

16. Personnel

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Transitional Increase of 100 Personnel

- Activity Description:

Increase of 100 personnel during the T-7A and T-38C transition period (i.e., 2032 through 2034). Assumed all personnel commute daily.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: No

End Month: 12

End Year: 2034

- Activity Emissions of Criteria Pollutants:

Pollutant	Total Emissions (TONs)
VOC	0.409993
SO _x	0.003005
NO _x	0.124758
CO	5.234423

Pollutant	Total Emissions (TONs)
PM 10	0.008724
PM 2.5	0.007714
Pb	0.000000
NH ₃	0.065363

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
-----------	------------------------

Pollutant	Total Emissions (TONs)
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CH ₄	0.021932
N ₂ O	0.008188

CO ₂	595.161765
CO _{2e}	598.146855

16.2 Personnel Assumptions

- Number of Personnel

Active Duty Personnel:	100
Civilian Personnel:	0
Support Contractor Personnel:	0
Air National Guard (ANG) Personnel:	0
Reserve Personnel:	0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule

Active Duty Personnel:	5 Days Per Week (default)
Civilian Personnel:	5 Days Per Week (default)
Support Contractor Personnel:	5 Days Per Week (default)
Air National Guard (ANG) Personnel:	4 Days Per Week (default)
Reserve Personnel:	4 Days Per Month (default)

16.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

16.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.27401	0.00192	0.08002	3.26598	0.01846	0.00655	0.04266
LDGT	0.20829	0.00258	0.11094	2.94852	0.01931	0.00714	0.03597
HDGV	0.53636	0.00582	0.33268	6.74281	0.04022	0.01923	0.08091
LDDV	0.10489	0.00121	0.14594	6.81082	0.02151	0.00818	0.01655
LDDT	0.08795	0.00116	0.14309	2.36609	0.01868	0.00677	0.01516
HDDV	0.06534	0.00394	1.43715	1.30874	0.11975	0.04718	0.06930
MC	2.41491	0.00283	0.65152	11.08874	0.02922	0.02059	0.05712

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01175	0.00448	271.98834	273.50441
LDGT	0.01197	0.00603	364.95167	366.88528
HDGV	0.03303	0.01988	825.01800	831.21040
LDDV	0.05557	0.00065	360.25469	361.98343
LDDT	0.02891	0.00094	345.63221	346.69024
HDDV	0.02446	0.17008	1177.21662	1222.97273
MC	0.09040	0.00267	394.35934	397.59777

16.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$$VMT_p = NP * WD * AC$$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
 NP: Number of Personnel
 WD: Work Days per Year
 AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$$

VMT_{Total}: Total Vehicle Miles Travel (miles)
 VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
 VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
 VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
 VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
 VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

$$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{Total}: Total Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Personnel On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-7As and LTOs

- Activity Description:

In 2032, add 24 T-7As and 2,192 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 1,446 CPs.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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VOC	19.526420
SO _x	2.344082
NO _x	32.241231
CO	148.863445

PM 10	3.160650
PM 2.5	2.856161
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.285293
N ₂ O	0.055150

Pollutant	Emissions Per Year (TONs)
CO ₂	6926.392851
CO ₂ e	6949.002349

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	18.961927
SO _x	2.203016
NO _x	29.229593
CO	144.941551

Pollutant	Emissions Per Year (TONs)
PM 10	2.793841
PM 2.5	2.506763
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.272139
N ₂ O	0.052560

Pollutant	Emissions Per Year (TONs)
CO ₂	6609.747230
CO ₂ e	6631.287285

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.303368
SO _x	0.069219
NO _x	1.014204
CO	3.491011

Pollutant	Emissions Per Year (TONs)
PM 10	0.074669
PM 2.5	0.066940
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008714
N ₂ O	0.001700

Pollutant	Emissions Per Year (TONs)
CO ₂	207.231174
CO ₂ e	207.925675

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.261125
SO _x	0.071848
NO _x	1.997434
CO	0.430883

Pollutant	Emissions Per Year (TONs)
PM 10	0.292140
PM 2.5	0.282458
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004440
N ₂ O	0.000891

Pollutant	Emissions Per Year (TONs)
CO ₂	109.414447
CO ₂ e	109.789389

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	2192
Number of Annual Trim Test(s) per Aircraft:	11

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

17.4 Auxiliary Power Unit (APU)

17.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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4501687C	211.0	0.0	0.0	740.4	740.7
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17.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

- APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
- APU: Number of Auxiliary Power Units
- OH: Operation Hours for Each LTO (hour)
- LTO: Number of LTOs
- EF_{POL}: Emission Factor for Pollutant (lb/hr)
- 2000: Conversion Factor pounds to tons

17.5 Aircraft Engine Test Cell

17.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	1
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

17.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

17.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$$

- TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Total Number of Engines (For All Aircraft)
- ARU: Annual Run-ups (Per Aircraft Engine)
- 2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$$

- TestCell: Aircraft Engine Test Cell Emissions (TONs)
- TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
- TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
 TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
 TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

17.6 Aerospace Ground Equipment (AGE)

17.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 2192

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

17.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

17.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Add T-7A CPs

- Activity Description:

In 2032, add 3,409 T-7A CPs not within an LTO.

1446 CPs within an LTO + 3409 CPs not within an LTO = 4855 CPs in 2032

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.000376
SO _x	0.573952
NO _x	8.894856
CO	1.733973

Pollutant	Emissions Per Year (TONs)
PM 10	0.063829
PM 2.5	0.054631
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.072254
N ₂ O	0.014097

Pollutant	Emissions Per Year (TONs)
CO ₂	1718.335817
CO ₂ e	1724.094535

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.000376
SO _x	0.573952
NO _x	8.894856
CO	1.733973

Pollutant	Emissions Per Year (TONs)
PM 10	0.063829
PM 2.5	0.054631
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.072254
N ₂ O	0.014097

Pollutant	Emissions Per Year (TONs)
CO ₂	1718.335817
CO ₂ e	1724.094535

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 24
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 3409
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.22
Climb Out [Intermediate] (mins): 1.38
Takeoff [Military] (mins): 0.38
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

18.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032 Remove T-38C LTOs

- Activity Description:

In 2032, decrease T-38C LTOs by 1,583.

Includes 1,045 CPs

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-4.777238
SO _x	-0.459750
NO _x	-0.915495
CO	-53.293148

Pollutant	Emissions Per Year (TONs)
PM 10	-1.252086
PM 2.5	-1.126301
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.057877
N ₂ O	-0.011292

Pollutant	Emissions Per Year (TONs)
CO ₂	-1376.431350
CO ₂ e	-1381.044232

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-4.777238
SO _x	-0.459750
NO _x	-0.915495
CO	-53.293148

Pollutant	Emissions Per Year (TONs)
PM 10	-1.252086
PM 2.5	-1.126301
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.057877
N ₂ O	-0.011292

Pollutant	Emissions Per Year (TONs)
CO ₂	-1376.431350
CO ₂ e	-1381.044232

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01

After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23
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- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	1583
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

19.4 Auxiliary Power Unit (APU)

19.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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19.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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19.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Remove T-38C CPs

- Activity Description:

In 2032, decrease T-38C CPs by 2,462.

1,045 CPs included within an LTO + 2,462 CPs not within an LTO = 3,507 CPs in 2032.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.704339
SO _x	-0.170900
NO _x	-0.164131
CO	-12.658037

Pollutant	Emissions Per Year (TONs)
PM 10	-0.302882
PM 2.5	-0.271772
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.021514
N ₂ O	-0.004197

Pollutant	Emissions Per Year (TONs)
CO ₂	-511.651443
CO ₂ e	-513.366158

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.704339
SO _x	-0.170900
NO _x	-0.164131
CO	-12.658037

Pollutant	Emissions Per Year (TONs)
PM 10	-0.302882
PM 2.5	-0.271772
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
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CH ₄	-0.021514
N ₂ O	-0.004197

CO ₂	-511.651443
CO ₂ e	-513.366158

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 2462
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.27
Climb Out [Intermediate] (mins): 1.42
Takeoff [Military] (mins): 0.39
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Add T-7As and LTOs

- Activity Description:

In 2033, add 48 T-7As and 10,960 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 7,234 CPs.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	75.986413
SO _x	7.204936
NO _x	97.854597
CO	376.326414

Pollutant	Emissions Per Year (TONs)
PM 10	7.771114
PM 2.5	7.068517
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.858021
N ₂ O	0.164849

Pollutant	Emissions Per Year (TONs)
CO ₂	21113.221293
CO ₂ e	21180.962949

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU part)]:

Pollutant	Emissions Per Year (TONs)
VOC	74.074053
SO _x	6.707258
NO _x	85.839018
CO	367.189978

Pollutant	Emissions Per Year (TONs)
PM 10	6.161075
PM 2.5	5.522346
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU part)]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.818395
N ₂ O	0.156996

Pollutant	Emissions Per Year (TONs)
CO ₂	20151.686708
CO ₂ e	20216.164654

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.606736
SO _x	0.138437
NO _x	2.028409
CO	6.982023

Pollutant	Emissions Per Year (TONs)
PM 10	0.149338
PM 2.5	0.133879
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.017428
N ₂ O	0.003400

Pollutant	Emissions Per Year (TONs)
CO ₂	414.462349
CO ₂ e	415.851351

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.305625
SO _x	0.359241
NO _x	9.987170
CO	2.154413

Pollutant	Emissions Per Year (TONs)
PM 10	1.460701
PM 2.5	1.412291
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.022199
N ₂ O	0.004453

Pollutant	Emissions Per Year (TONs)
CO ₂	547.072236
CO ₂ e	548.946944

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 48
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 10960
Number of Annual Trim Test(s) per Aircraft: 11

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

21.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

21.4 Auxiliary Power Unit (APU)

21.4.1 Auxiliary Power Unit (APU) Assumptions

- **Default Settings Used:** Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
4501687C	211.0	0.0	0.0	740.4	740.7

21.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL} : Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)

APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL} : Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

21.5 Aircraft Engine Test Cell

21.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 48

- **Default Settings Used:** No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	1
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

21.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

21.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$\text{TestCellPS}_{\text{POL}} = (\text{TD} / 60) * (\text{FC} / 1000) * \text{EF} * \text{NE} * \text{ARU} / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$\text{TestCell} = \text{TestCellPS}_{\text{IDLE}} + \text{TestCellPS}_{\text{APPROACH}} + \text{TestCellPS}_{\text{INTERMEDIATE}} + \text{TestCellPS}_{\text{MILITARY}} + \text{TestCellPS}_{\text{AFTERBURN}}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

21.6 Aerospace Ground Equipment (AGE)

21.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 10960

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

21.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

21.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Add T-7A CPs

- Activity Description:

In 2033, add 17,043 T-7A CPs not within an LTO.

7,234 CPs within an LTO + 17,043 CPs not within an LTO = 24,277 CPs in 2033

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	5.001295
SO _x	2.869421
NO _x	44.469061
CO	8.668848

Pollutant	Emissions Per Year (TONs)
PM 10	0.319107
PM 2.5	0.273122
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.361225
N ₂ O	0.070475

Pollutant	Emissions Per Year (TONs)
CO ₂	8590.670966
CO ₂ e	8619.461181

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	5.001295
SO _x	2.869421
NO _x	44.469061
CO	8.668848

Pollutant	Emissions Per Year (TONs)
PM 10	0.319107
PM 2.5	0.273122
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.361225
N ₂ O	0.070475

Pollutant	Emissions Per Year (TONs)
CO ₂	8590.670966
CO ₂ e	8619.461181

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 48
Flight Operation Cycle Type: CP (Close Pattern)

Number of Annual Flight Operation Cycles for all Aircraft: 17043
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.22
Climb Out [Intermediate] (mins): 1.38
Takeoff [Military] (mins): 0.38
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Remove T-38Cs and LTOs

- Activity Description:

By 2033, remove 14 T-38Cs and 9,925 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 6,552 CPs within an LTO

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-34.586844
SO _x	-3.861498
NO _x	-17.186178
CO	-373.270878

Pollutant	Emissions Per Year (TONs)
PM 10	-9.803345
PM 2.5	-8.908030
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.465265
N ₂ O	-0.090883

Pollutant	Emissions Per Year (TONs)
CO ₂	-11082.275214
CO ₂ e	-11119.453016

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-33.086316
SO _x	-3.478375
NO _x	-7.994414
CO	-367.273121

Pollutant	Emissions Per Year (TONs)
PM 10	-8.397082
PM 2.5	-7.554083
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.437885
N ₂ O	-0.085432

Pollutant	Emissions Per Year (TONs)
CO ₂	-10413.800801
CO ₂ e	-10448.700934

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.318199
SO _x	-0.057806
NO _x	-0.147725
CO	-4.046794

Pollutant	Emissions Per Year (TONs)
PM 10	-0.083502
PM 2.5	-0.075024
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007277
N ₂ O	-0.001420

Pollutant	Emissions Per Year (TONs)
CO ₂	-173.064565
CO ₂ e	-173.644562

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.182329
SO _x	-0.325317
NO _x	-9.044039
CO	-1.950962

Pollutant	Emissions Per Year (TONs)
PM 10	-1.322760
PM 2.5	-1.278923
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.020103
N ₂ O	-0.004032

Pollutant	Emissions Per Year (TONs)
CO ₂	-495.409849
CO ₂ e	-497.107520

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	9925
Number of Annual Trim Test(s) per Aircraft:	17

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23.4 Auxiliary Power Unit (APU)

23.4.1 Auxiliary Power Unit (APU) Assumptions

- **Default Settings Used:** Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

23.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}

23.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

23.5 Aircraft Engine Test Cell

23.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 28

- Default Settings Used: No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	3
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

23.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

23.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Total Number of Engines (For All Aircraft)
 ARU: Annual Run-ups (Per Aircraft Engine)
 2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
 TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
 TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
 TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
 TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

23.6 Aerospace Ground Equipment (AGE)

23.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 9925

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

23.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

23.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033 Remove T-38C CPs

- Activity Description:

By 2033, remove 15,433 T-38C CPs not included in an LTO.

6,552 CPs included in an LTO + 15,433 CPs not included in an LTO = 21,985 CPs in 2033

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-4.415139
SO _x	-1.071282
NO _x	-1.028852
CO	-79.346666

Pollutant	Emissions Per Year (TONs)
PM 10	-1.898609
PM 2.5	-1.703595
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.134861
N ₂ O	-0.026311

Pollutant	Emissions Per Year (TONs)
CO ₂	-3207.277304
CO ₂ e	-3218.025964

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-4.415139
SO _x	-1.071282
NO _x	-1.028852
CO	-79.346666

Pollutant	Emissions Per Year (TONs)
PM 10	-1.898609
PM 2.5	-1.703595
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.134861
N ₂ O	-0.026311

Pollutant	Emissions Per Year (TONs)
CO ₂	-3207.277304
CO ₂ e	-3218.025964

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R
 Primary Function: Trainer
 Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 15433
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.27
Climb Out [Intermediate] (mins): 1.42
Takeoff [Military] (mins): 0.39
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034 Add T-7As and LTOs

- **Activity Description:**

In 2034, add 27 T-7As and 9,864 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 6,511 CPs,

- **Activity Start Date**

Start Month: 1
Start Year: 2034

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	63.517493
SO _x	5.468460
NO _x	73.815036
CO	255.895840

Pollutant	Emissions Per Year (TONs)
PM 10	5.186772
PM 2.5	4.738901
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.644320
N ₂ O	0.123411

Pollutant	Emissions Per Year (TONs)
CO ₂	15960.181996
CO ₂ e	16010.955674

- **Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:**

Pollutant	Emissions Per Year (TONs)
VOC	62.001141
SO _x	5.067272
NO _x	63.685603
CO	250.029481

Pollutant	Emissions Per Year (TONs)
PM 10	3.788138
PM 2.5	3.392531
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.614538
N ₂ O	0.117491

Pollutant	Emissions Per Year (TONs)
CO ₂	15234.681913
CO ₂ e	15282.987040

- **Activity Emissions of Criteria Pollutants [Test Cell part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.341289
SO _x	0.077871
NO _x	1.140980
CO	3.927388

Pollutant	Emissions Per Year (TONs)
PM 10	0.084003
PM 2.5	0.075307
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009803
N ₂ O	0.001913

Pollutant	Emissions Per Year (TONs)
CO ₂	233.135071
CO ₂ e	233.916385

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.175062
SO _x	0.323317
NO _x	8.988453
CO	1.938971

Pollutant	Emissions Per Year (TONs)
PM 10	1.314631
PM 2.5	1.271062
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.019979
N ₂ O	0.004007

Pollutant	Emissions Per Year (TONs)
CO ₂	492.365012
CO ₂ e	494.052250

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 27
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 9864
Number of Annual Trim Test(s) per Aircraft: 11

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 13.16
Approach [Approach] (mins): 5.18
Climb Out [Intermediate] (mins): 0.49
Takeoff [Military] (mins): 1.01
Takeoff [After Burn] (mins): 0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25.4 Auxiliary Power Unit (APU)

25.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

25.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
4501687C	211.0	0.0	0.0	740.4	740.7

25.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)

APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

25.5 Aircraft Engine Test Cell

25.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 27

- Default Settings Used: No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	1
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

25.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

25.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$\text{TestCellPS}_{\text{POL}} = (\text{TD} / 60) * (\text{FC} / 1000) * \text{EF} * \text{NE} * \text{ARU} / 2000$$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$$\text{TestCell} = \text{TestCellPS}_{\text{IDLE}} + \text{TestCellPS}_{\text{APPROACH}} + \text{TestCellPS}_{\text{INTERMEDIATE}} + \text{TestCellPS}_{\text{MILITARY}} + \text{TestCellPS}_{\text{AFTERBURN}}$$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

25.6 Aerospace Ground Equipment (AGE)

25.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 9864

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

25.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

25.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

- AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
- AGE: Total Number of Aerospace Ground Equipment
- OH: Operation Hours for Each LTO (hour)
- LTO: Number of LTOs
- EF_{POL}: Emission Factor for Pollutant (lb/hr)
- 2000: Conversion Factor pounds to tons

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Add T-7A CPs

- Activity Description:

In 2034, add 15,339 T-7A CPs not within an LTO.

6,511 CPs within an LTO + 15,339 CPs not within an LTO = 21,850 CPs in 2034

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	4.501254
SO _x	2.582529
NO _x	40.022937
CO	7.802116

Pollutant	Emissions Per Year (TONs)
PM 10	0.287202
PM 2.5	0.245815
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.325109
N ₂ O	0.063429

Pollutant	Emissions Per Year (TONs)
CO ₂	7731.755087
CO ₂ e	7757.666787

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.501254
SO _x	2.582529
NO _x	40.022937
CO	7.802116

Pollutant	Emissions Per Year (TONs)
PM 10	0.287202
PM 2.5	0.245815
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.325109
N ₂ O	0.063429

Pollutant	Emissions Per Year (TONs)
CO ₂	7731.755087
CO ₂ e	7757.666787

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 15339
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.22
Climb Out [Intermediate] (mins): 1.38
Takeoff [Military] (mins): 0.38
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Remove T-38Cs and LTOs

- Activity Description:

By 2034, remove 49 T-38Cs and 3,836 LTOs, including flightline maintenance (trim test/trim pad runups) and engine test cell, and AGE.

Includes 2,530 CPs

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-24.117036
SO _x	-3.527661
NO _x	-14.121764
CO	-260.046394

Pollutant	Emissions Per Year (TONs)
PM 10	-5.751515
PM 2.5	-5.209827
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.436031
N ₂ O	-0.085112

Pollutant	Emissions Per Year (TONs)
CO ₂	-10376.398970
CO ₂ e	-10411.188207

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-22.546371
SO _x	-3.199605
NO _x	-10.109217
CO	-245.128571

Pollutant	Emissions Per Year (TONs)
PM 10	-4.948011
PM 2.5	-4.452940
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.402791
N ₂ O	-0.078585

Pollutant	Emissions Per Year (TONs)
CO ₂	-9579.197711
CO ₂ e	-9611.300810

- Activity Emissions of Criteria Pollutants [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.113696
SO _x	-0.202322
NO _x	-0.517038
CO	-14.163779

Pollutant	Emissions Per Year (TONs)
PM 10	-0.292259
PM 2.5	-0.262586
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.025470
N ₂ O	-0.004969

Pollutant	Emissions Per Year (TONs)
CO ₂	-605.725976
CO ₂ e	-607.755967

- Activity Emissions of Criteria Pollutants [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.456969
SO _x	-0.125734
NO _x	-3.495510
CO	-0.754044

Pollutant	Emissions Per Year (TONs)
PM 10	-0.511245
PM 2.5	-0.494302
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007770
N ₂ O	-0.001558

Pollutant	Emissions Per Year (TONs)
CO ₂	-191.475283
CO ₂ e	-192.131430

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64

Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft:	3836
Number of Annual Trim Test(s) per Aircraft:	17

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.56
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	0.6
Takeoff [After Burn] (mins):	0.43

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27.4 Auxiliary Power Unit (APU)

27.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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27.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
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27.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

27.5 Aircraft Engine Test Cell

27.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell

Total Number of Aircraft Engines Tested Annually: 98

- Default Settings Used: No

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	3
Idle Duration (mins):	12
Approach Duration (mins):	27
Intermediate Duration (mins):	9
Military Duration (mins):	9
After Burner Duration (mins):	3

27.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

27.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

TestCellPS_{POL}: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Total Number of Engines (For All Aircraft)

ARU: Annual Run-ups (Per Aircraft Engine)

2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

TestCellPS_{IDLE}: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

TestCellPS_{APPROACH}: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

TestCellPS_{INTERMEDIATE}: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

TestCellPS_{MILITARY}: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

TestCellPS_{AFTERBURN}: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

27.6 Aerospace Ground Equipment (AGE)

27.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage

Number of Annual LTO (Landing and Take-off) cycles for AGE: 3836

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.5	No	Air Compressor	MC-1A - 18.4hp
1	0.17	No	Generator Set	A/M32A-86D
1	0.17	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-1-1
1	1	No	Light Cart	TF-1

27.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006
MJ-1-1	2.5	0.026	0.018	0.757	0.043	0.109	0.105
TF-1	0.0	0.025	0.043	0.170	0.130	0.160	0.155

- Aerospace Ground Equipment (AGE) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
MC-1A - 18.4hp	1.1	0.0	0.0	24.5	24.6
A/M32A-86D	6.5	0.0	0.0	145.6	146.1
H1	0.4	0.0	0.0	8.8	8.8
MJ-1-1	2.5	0.0	0.0	56.7	56.9
TF-1	0.0	0.0	0.0	33.0	33.1

27.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)

AGE: Total Number of Aerospace Ground Equipment

OH: Operation Hours for Each LTO (hour)

LTO: Number of LTOs

EF_{POL}: Emission Factor for Pollutant (lb/hr)

2000: Conversion Factor pounds to tons

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034 Remove T-38C CPs

- Activity Description:

By 2034, remove 5,967 T-38C CPs.

2,530 CPs within an LTO + 5,967 CPs not within an LTO = 8,497 CPs in 2034

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-1.707065
SO _x	-0.414199
NO _x	-0.397794
CO	-30.678517

Pollutant	Emissions Per Year (TONs)
PM 10	-0.734076
PM 2.5	-0.658676
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.052143
N ₂ O	-0.010173

Pollutant	Emissions Per Year (TONs)
CO ₂	-1240.058555
CO ₂ e	-1244.214406

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.707065
SO _x	-0.414199
NO _x	-0.397794
CO	-30.678517

Pollutant	Emissions Per Year (TONs)
PM 10	-0.734076
PM 2.5	-0.658676
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.052143
N ₂ O	-0.010173

Pollutant	Emissions Per Year (TONs)
CO ₂	-1240.058555
CO ₂ e	-1244.214406

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

28.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 5967
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.27
Climb Out [Intermediate] (mins): 1.42
Takeoff [Military] (mins): 0.39
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

28.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

29. Aircraft

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035 Add T-7As LTOs

- Activity Description:

In 2035, add 1,096 T-7A LTOs.

Includes 723 CPs.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	6.025033
SO _x	0.383538
NO _x	4.563305
CO	12.884480

Pollutant	Emissions Per Year (TONs)
PM 10	0.095565
PM 2.5	0.084803
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.045686
N ₂ O	0.008646

Pollutant	Emissions Per Year (TONs)
CO ₂	1155.365375
CO ₂ e	1158.931681

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	6.025033
SO _x	0.383538
NO _x	4.563305
CO	12.884480

Pollutant	Emissions Per Year (TONs)
PM 10	0.095565
PM 2.5	0.084803
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.045686
N ₂ O	0.008646

Pollutant	Emissions Per Year (TONs)
CO ₂	1155.365375
CO ₂ e	1158.931681

29.2 Aircraft & Engines

29.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

29.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

29.3 Flight Operations

29.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		99
Flight Operation Cycle Type:	LTO (Landing and Takeoff)	
Number of Annual Flight Operation Cycles for all Aircraft:		1096
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	13.16
Approach [Approach] (mins):	5.18
Climb Out [Intermediate] (mins):	0.49
Takeoff [Military] (mins):	1.01
Takeoff [After Burn] (mins):	0.02

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	15
Approach (mins):	10
Intermediate (mins):	15
Military (mins):	15
AfterBurn (mins):	10

29.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

29.4 Auxiliary Power Unit (APU)

29.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.25	No	4501687C	Hamilton Sundstrand

29.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
4501687C	211.0	0.0	0.0	740.4	740.7

29.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
 APU: Number of Auxiliary Power Units
 OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

30. Aircraft

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Garfield

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035 Add T-7A CPs

- Activity Description:

In 2035, add 1,705 T-7A CPs not within an LTO.

723 CPs within an LTO + 1,705 CPs not within LTO = 2,428 CPs in 2035

- Activity Start Date

Start Month: 1

Start Year: 2035

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.500335
SO _x	0.287060
NO _x	4.448733
CO	0.867241

Pollutant	Emissions Per Year (TONs)
PM 10	0.031924
PM 2.5	0.027323
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.036137
N ₂ O	0.007050

Pollutant	Emissions Per Year (TONs)
CO ₂	859.419938
CO ₂ e	862.300142

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.500335
SO _x	0.287060
NO _x	4.448733
CO	0.867241

Pollutant	Emissions Per Year (TONs)
PM 10	0.031924
PM 2.5	0.027323
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.036137
N ₂ O	0.007050

Pollutant	Emissions Per Year (TONs)
CO ₂	859.419938
CO ₂ e	862.300142

30.2 Aircraft & Engines

30.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

30.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

30.3 Flight Operations

30.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 1705
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 2.22
Climb Out [Intermediate] (mins): 1.38
Takeoff [Military] (mins): 0.38
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

30.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

Vance AFB ROI: Alternative 3 GHG Report

AIR CONFORMITY APPLICABILITY MODEL REPORT GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to estimate GHG emissions associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the GHG emissions analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB
State: Oklahoma
County(s): Garfield
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: T-7A Recapitalization at Vance AFB - Alternative 3

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2028

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

The analysis for all construction and operation actions assumes the following: (1) MILCON/UMMC projects would occur over a period of 2 years and FSRM projects would occur over a period of 1 year; (2) during construction, no materials would be required to be hauled on- or off-site as excavated spoils will be used on-site; (3) no new emergency generators, or if any were needed for new facilities, their emissions would be offset by removing generators that were supporting T-38C operations; and (4) T-7A fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the T-38C operations.

f. Point of Contact:

Name: Carolyn Hein
Title: Contractor
Organization: HDR
Email:

Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action's start through the action's "steady state" (SS, net gain/loss in emission stabilized and the action is fully implemented) of emissions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO₂ equivalents (CO₂e). The CO₂e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO₂. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO₂e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO₂e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO₂e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected steady state of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	CO₂	CH₄	N₂O	CO₂e	Threshold	Exceedance
2028	1,929	0.07514998	0.03421646	1,942	68,039	No
2029	854	0.03239394	0.02064201	861	68,039	No
2030	16	0.00029648	0.00029648	16	68,039	No
2031	16	0.00029648	0.00029648	16	68,039	No
2032	6,325	0.25926687	0.05154091	6,346	68,039	No
2033	20,309	0.82092365	0.15870589	20,374	68,039	No
2034	31,264	1.25751103	0.24176248	31,363	68,039	No
2035	32,911	1.32510798	0.25352603	33,016	68,039	No
2036 [SS Year]	32,911	1.32510798	0.25352603	33,016	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. <https://statesummaries.ncics.org/downloads/>).

State's Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2028	94,683,042	1,117,798	43,525	137,515,492
2029	94,683,042	1,117,798	43,525	137,515,492
2030	94,683,042	1,117,798	43,525	137,515,492
2031	94,683,042	1,117,798	43,525	137,515,492

2032	94,683,042	1,117,798	43,525	137,515,492
2033	94,683,042	1,117,798	43,525	137,515,492
2034	94,683,042	1,117,798	43,525	137,515,492
2035	94,683,042	1,117,798	43,525	137,515,492
2036 [SS Year]	94,683,042	1,117,798	43,525	137,515,492

U.S. Annual GHG Emissions (mton/yr)				
YEAR	CO2	CH4	N2O	CO2e
2028	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2029	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2030	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2031	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2032	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2033	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2034	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2035	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2036 [SS Year]	5,136,454,179	25,626,912	1,500,708	6,251,695,230

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (Rtba.e., global, national, and regional) and the degree (intensity) of the proposed action’s effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative’s annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action’s surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area’s ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action’s GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action’s net change in GHG emissions is compared relative to the state (where the action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action’s net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2028-2036	State Total	852,147,374	10,060,178	391,725	1,237,639,431
2028-2036	U.S. Total	46,228,087,611	230,642,205	13,506,369	56,265,257,066
2028-2036	Action	126,536	5.096054	1.014513	126,948
Percent of State Totals		0.01484904%	0.00005066%	0.00025899%	0.01025729%
Percent of U.S. Totals		0.00027372%	0.00000221%	0.00000751%	0.00022562%

From a global context, the action's total GHG percentage of total global GHG for the same time period is:
0.00003023%.*

* Global value based on the U.S. emitting 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, <https://www.c2es.org/content/international-emissions>).

SUA ROI

SUA ROI: Alternative 1 ACAM Report (Low Flight Patterns)

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Department of the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Vance AFB T-7A EIS: Alternative 1, SUA Low Flight Pattern

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2032

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

f. Point of Contact:

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the GCR are:

	applicable
X	not applicable

Total reasonably foreseeable net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving “steady state” (hsba.e., no net gain/loss in emission stabilized and the action is fully implemented) emissions. The ACAM analysis uses the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the *USAF Air Emissions Guide for Air Force Stationary Sources*, the *USAF Air Emissions Guide for Air Force Mobile Sources*, and the *USAF Air Emissions Guide for Air Force Transitory Sources*.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of the proposed Action’s potential impacts to local air quality. The insignificance indicators are trivial (de minimis) rate thresholds that have been demonstrated to have little to no impact to air quality. These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold and 25 ton/yr for lead for actions occurring in areas that are "Attainment" (hsba.e., not exceeding any National Ambient Air Quality Standard (NAAQS)). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutants is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQS. For further detail on insignificance indicators, refer to *Level II, Air Quality Quantitative Assessment, Insignificance Indicators*.

The action’s net emissions for every year through achieving steady state were compared against the Insignificance Indicators and are summarized below.

Analysis Summary:

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.330	250	No
NOx	22.630	250	No
CO	-10.034	250	No
SOx	0.364	250	No
PM 10	-0.301	250	No
PM 2.5	-0.271	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2033

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.218	250	No
NOx	134.290	250	No
CO	-43.279	250	No
SOx	2.692	250	No
PM 10	-1.197	250	No
PM 2.5	-1.083	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2034

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.485	250	No
NOx	172.112	250	No
CO	-57.878	250	No
SOx	3.372	250	No
PM 10	-1.622	250	No
PM 2.5	-1.466	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2035 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.485	250	No
NOx	172.112	250	No
CO	-57.878	250	No
SOx	3.372	250	No
PM 10	-1.622	250	No
PM 2.5	-1.466	250	No
Pb	0.000	25	No
NH3	0.000	250	No

None of the estimated annual net emissions associated with this action are above the insignificance indicators; therefore, the action will not cause or contribute to an exceedance of one or more NAAQSs and will have an insignificant impact on air quality. No further air assessment is needed.

Carolyn Hein, Contractor

Mar 19 2025

Name, Title

Date

SUA ROI: Alternative 1 ACAM Detail Report (Low Flight Patterns)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Action Title:** Vance AFB T-7A EIS: Alternative 1, SUA Low Flight Pattern

- **Project Number/s (if applicable):**

- **Projected Action Start Date:** 1 / 2032

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

- Point of Contact

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-145)
3.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-171)
4.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-175)
5.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-181)
6.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-185)
7.	Aircraft	2032: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
8.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-145)
9.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-171)
10.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-175)
11.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-181)
12.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-185)
13.	Aircraft	2032: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)
14.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-145)
15.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-171)
16.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-175)
17.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-181)
18.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-185)
19.	Aircraft	2033: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
20.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-145)
21.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-171)
22.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-175)
23.	Aircraft	2033: Add T-38C MTR Low-Altitude Operations (IR-181)
24.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-185)
25.	Aircraft	2033: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)
26.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-145)
27.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-171)
28.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-175)
29.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-181)
30.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-185)
31.	Aircraft	2034: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
32.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-145)
33.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-171)
34.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-175)
35.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-181)
36.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-185)
37.	Aircraft	2034: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Low-Altitude Operations (IR-145)

- **Activity Description:**

In 2032, add 44 T-7A Low-Altitude Operations in IR-145 with 24 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.244201
SO _x	0.115108
NO _x	3.550055
CO	0.202246

Pollutant	Emissions Per Year (TONs)
PM 10	0.017212
PM 2.5	0.015061
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014491
N ₂ O	0.002827

Pollutant	Emissions Per Year (TONs)
CO ₂	344.617853
CO ₂ e	345.822720

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.244201
SO _x	0.115108
NO _x	3.550055
CO	0.202246

Pollutant	Emissions Per Year (TONs)
PM 10	0.017212
PM 2.5	0.015061
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014491
N ₂ O	0.002827

Pollutant	Emissions Per Year (TONs)
CO ₂	344.617853
CO ₂ e	345.822720

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		44
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2032, add 23 T-7A Low-Altitude Operations in IR-171 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.114445

Pollutant	Emissions Per Year (TONs)
PM 10	0.008067

SO _x	0.053946
NO _x	1.663741
CO	0.094783

PM 2.5	0.007058
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.006791
N ₂ O	0.001325

Pollutant	Emissions Per Year (TONs)
CO ₂	161.505859
CO ₂ e	162.070523

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.114445
SO _x	0.053946
NO _x	1.663741
CO	0.094783

Pollutant	Emissions Per Year (TONs)
PM 10	0.008067
PM 2.5	0.007058
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.006791
N ₂ O	0.001325

Pollutant	Emissions Per Year (TONs)
CO ₂	161.505859
CO ₂ e	162.070523

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 23
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{\text{TRIM}} = AEPS_{\text{IDLE}} + AEPS_{\text{APPROACH}} + AEPS_{\text{INTERMEDIATE}} + AEPS_{\text{MILITARY}} + AEPS_{\text{AFTERBURN}}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2032, add 26 T-7A Low-Altitude Operations in IR-175 with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.154252
SO _x	0.072709
NO _x	2.242433
CO	0.127751

Pollutant	Emissions Per Year (TONs)
PM 10	0.010872
PM 2.5	0.009513
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009153
N ₂ O	0.001786

Pollutant	Emissions Per Year (TONs)
CO ₂	217.681810
CO ₂ e	218.442878

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.154252
SO _x	0.072709
NO _x	2.242433
CO	0.127751

Pollutant	Emissions Per Year (TONs)
PM 10	0.010872
PM 2.5	0.009513
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
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CH ₄	0.009153
N ₂ O	0.001786

CO ₂	217.681810
CO ₂ e	218.442878

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 26
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Low-Altitude Operations (IR-181)

- **Activity Description:**

In 2032, add 24 T-7A Low-Altitude Operations in IR-181 with 24 aircraft

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.119421
SO _x	0.056291
NO _x	1.736077
CO	0.098904

Pollutant	Emissions Per Year (TONs)
PM 10	0.008417
PM 2.5	0.007365
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.119421
SO _x	0.056291
NO _x	1.736077
CO	0.098904

Pollutant	Emissions Per Year (TONs)
PM 10	0.008417
PM 2.5	0.007365
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		24
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2032, add 33 T-7A Low-Altitude Operations in IR-185 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.195782
SO _x	0.092285
NO _x	2.846165
CO	0.162145

Pollutant	Emissions Per Year (TONs)
PM 10	0.013800
PM 2.5	0.012075
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011618
N ₂ O	0.002267

Pollutant	Emissions Per Year (TONs)
CO ₂	276.288451
CO ₂ e	277.254422

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.195782
SO _x	0.092285
NO _x	2.846165
CO	0.162145

Pollutant	Emissions Per Year (TONs)
PM 10	0.013800
PM 2.5	0.012075
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011618
N ₂ O	0.002267

Pollutant	Emissions Per Year (TONs)
CO ₂	276.288451
CO ₂ e	277.254422

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 33
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2032, add 116 T-7A Low-Altitude Operations in Vance 1E MOA with 24 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.777002
SO _x	0.366252
NO _x	11.295631
CO	0.643509

Pollutant	Emissions Per Year (TONs)
PM 10	0.054767
PM 2.5	0.047921
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.777002
SO _x	0.366252
NO _x	11.295631
CO	0.643509

Pollutant	Emissions Per Year (TONs)
PM 10	0.054767
PM 2.5	0.047921
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 116
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2032, remove 33 T-38C Low-Altitude Operations in IR-145 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.026557
SO _x	-0.037888
NO _x	-0.067985
CO	-1.097325

Pollutant	Emissions Per Year (TONs)
PM 10	-0.040012
PM 2.5	-0.035763
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.004770
N ₂ O	-0.000931

Pollutant	Emissions Per Year (TONs)
CO ₂	-113.430607
CO ₂ e	-113.827188

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.026557
SO _x	-0.037888
NO _x	-0.067985
CO	-1.097325

Pollutant	Emissions Per Year (TONs)
PM 10	-0.040012
PM 2.5	-0.035763
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.004770
N ₂ O	-0.000931

Pollutant	Emissions Per Year (TONs)
CO ₂	-113.430607
CO ₂ e	-113.827188

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:
Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 33
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2032, remove 29 T-38C Low-Altitude Operations in IR-171 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.020924
SO _x	-0.029851
NO _x	-0.053564
CO	-0.864559

Pollutant	Emissions Per Year (TONs)
PM 10	-0.031525
PM 2.5	-0.028177
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003758
N ₂ O	-0.000733

Pollutant	Emissions Per Year (TONs)
CO ₂	-89.369569
CO ₂ e	-89.682027

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.020924
SO _x	-0.029851
NO _x	-0.053564
CO	-0.864559

Pollutant	Emissions Per Year (TONs)
PM 10	-0.031525
PM 2.5	-0.028177
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003758
N ₂ O	-0.000733

Pollutant	Emissions Per Year (TONs)
CO ₂	-89.369569
CO ₂ e	-89.682027

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	29
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2032, remove 21 T-38C Low-Altitude Operations in IR-175 with 63 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.018065
SO _x	-0.025773
NO _x	-0.046247
CO	-0.746456

Pollutant	Emissions Per Year (TONs)
PM 10	-0.027218
PM 2.5	-0.024328
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.018065
SO _x	-0.025773
NO _x	-0.046247
CO	-0.746456

Pollutant	Emissions Per Year (TONs)
PM 10	-0.027218
PM 2.5	-0.024328
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	21
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2032, remove 148 T-38C Low-Altitude Operations in IR-181 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.106782
SO _x	-0.152342
NO _x	-0.273362
CO	-4.412232

Pollutant	Emissions Per Year (TONs)
PM 10	-0.160885
PM 2.5	-0.143800
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019178
N ₂ O	-0.003742

Pollutant	Emissions Per Year (TONs)
CO ₂	-456.092973
CO ₂ e	-457.687585

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.106782
SO _x	-0.152342
NO _x	-0.273362
CO	-4.412232

Pollutant	Emissions Per Year (TONs)
PM 10	-0.160885
PM 2.5	-0.143800
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019178
N ₂ O	-0.003742

Pollutant	Emissions Per Year (TONs)
CO ₂	-456.092973
CO ₂ e	-457.687585

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64

After Burn	7695.00	0.13	0.03	3203.44	3214.64
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11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		148
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2032, remove 20 T-38C Low-Altitude Operations in IR-185 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.017205
SO _x	-0.024546
NO _x	-0.044045
CO	-0.710911

Pollutant	Emissions Per Year (TONs)
PM 10	-0.025922
PM 2.5	-0.023169
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003090
N ₂ O	-0.000603

Pollutant	Emissions Per Year (TONs)
CO ₂	-73.486914
CO ₂ e	-73.743842

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.017205
SO _x	-0.024546
NO _x	-0.044045
CO	-0.710911

Pollutant	Emissions Per Year (TONs)
PM 10	-0.025922
PM 2.5	-0.023169
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003090
N ₂ O	-0.000603

Pollutant	Emissions Per Year (TONs)
CO ₂	-73.486914
CO ₂ e	-73.743842

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	20
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2032, remove 88 T-38C Low-Altitude Operations in Vance 1E MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.085470
SO _x	-0.121937
NO _x	-0.218803
CO	-3.531620

Pollutant	Emissions Per Year (TONs)
PM 10	-0.128775
PM 2.5	-0.115100
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015350
N ₂ O	-0.002995

Pollutant	Emissions Per Year (TONs)
CO ₂	-365.064022
CO ₂ e	-366.340374

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.085470
SO _x	-0.121937
NO _x	-0.218803
CO	-3.531620

Pollutant	Emissions Per Year (TONs)
PM 10	-0.128775
PM 2.5	-0.115100
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015350
N ₂ O	-0.002995

Pollutant	Emissions Per Year (TONs)
CO ₂	-365.064022
CO ₂ e	-366.340374

13.2 Aircraft & Engines

13.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

13.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 88
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2033, add 215 T-7A Low-Altitude Operations in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.193254
SO _x	0.562459
NO _x	17.346861
CO	0.988245

Pollutant	Emissions Per Year (TONs)
PM 10	0.084106
PM 2.5	0.073593
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.070807
N ₂ O	0.013814

Pollutant	Emissions Per Year (TONs)
CO ₂	1683.928146
CO ₂ e	1689.815565

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.193254
SO _x	0.562459
NO _x	17.346861
CO	0.988245

Pollutant	Emissions Per Year (TONs)
PM 10	0.084106
PM 2.5	0.073593
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.070807
N ₂ O	0.013814

Pollutant	Emissions Per Year (TONs)
CO ₂	1683.928146
CO ₂ e	1689.815565

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

14.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 215
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2033, add 111 T-7A Low-Altitude Operations in IR-171 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.552322
SO _x	0.260346
NO _x	8.029357
CO	0.457430

Pollutant	Emissions Per Year (TONs)
PM 10	0.038930
PM 2.5	0.034064
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.032774
N ₂ O	0.006394

Pollutant	Emissions Per Year (TONs)
CO ₂	779.441320
CO ₂ e	782.166435

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.552322
SO _x	0.260346
NO _x	8.029357
CO	0.457430

Pollutant	Emissions Per Year (TONs)
PM 10	0.038930
PM 2.5	0.034064
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.032774
N ₂ O	0.006394

Pollutant	Emissions Per Year (TONs)
CO ₂	779.441320
CO ₂ e	782.166435

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

15.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	111
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16. Aircraft

16.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Low-Altitude Operations (IR-175)

- **Activity Description:**

In 2033, add 126 T-7A Low-Altitude Operations in IR-175 with 68 aircraft.

- **Activity Start Date**

Start Month: 1

Start Year: 2033

- **Activity End Date**

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.747530
SO _x	0.352360
NO _x	10.867176
CO	0.619100

Pollutant	Emissions Per Year (TONs)
PM 10	0.052689
PM 2.5	0.046103
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.044358
N ₂ O	0.008654

Pollutant	Emissions Per Year (TONs)
CO ₂	1054.919541
CO ₂ e	1058.607794

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.747530
SO _x	0.352360
NO _x	10.867176
CO	0.619100

Pollutant	Emissions Per Year (TONs)
PM 10	0.052689
PM 2.5	0.046103
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.044358
N ₂ O	0.008654

Pollutant	Emissions Per Year (TONs)
CO ₂	1054.919541
CO ₂ e	1058.607794

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

16.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 126
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

16.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2033, add 119 T-7A Low-Altitude Operations in IR-181 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.592129
SO _x	0.279109
NO _x	8.608049
CO	0.490398

Pollutant	Emissions Per Year (TONs)
PM 10	0.041736
PM 2.5	0.036519
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.035136
N ₂ O	0.006855

Pollutant	Emissions Per Year (TONs)
CO ₂	835.617271
CO ₂ e	838.538790

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.592129
SO _x	0.279109
NO _x	8.608049

Pollutant	Emissions Per Year (TONs)
PM 10	0.041736
PM 2.5	0.036519
Pb	0.000000

CO	0.490398
----	----------

NH ₃	0.000000
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- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.035136
N ₂ O	0.006855

Pollutant	Emissions Per Year (TONs)
CO ₂	835.617271
CO ₂ e	838.538790

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 119
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0

Military (mins): 0
AfterBurn (mins): 0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2033, add 163 T-7A Low-Altitude Operations in IR-185 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.967043
SO _x	0.455831
NO _x	14.058330
CO	0.800899

Pollutant	Emissions Per Year (TONs)
PM 10	0.068162
PM 2.5	0.059641
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057384
N ₂ O	0.011196

Pollutant	Emissions Per Year (TONs)
CO ₂	1364.697501
CO ₂ e	1369.468813

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.967043
SO _x	0.455831
NO _x	14.058330
CO	0.800899

Pollutant	Emissions Per Year (TONs)
PM 10	0.068162
PM 2.5	0.059641
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057384
N ₂ O	0.011196

Pollutant	Emissions Per Year (TONs)
CO ₂	1364.697501
CO ₂ e	1369.468813

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
 - Is Aircraft & Engine a Surrogate? No
 - Original Aircraft Name:
 - Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)
 - Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft: 68
 - Flight Operation Cycle Type: LFP (Low Flight Pattern)
 - Number of Annual Flight Operation Cycles for all Aircraft: 163
 - Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi [Idle] (mins): 0
 - Approach [Approach] (mins): 0
 - Climb Out [Intermediate] (mins): 0
 - Takeoff [Military] (mins): 31
 - Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins): 0
 - Approach (mins): 0
 - Intermediate (mins): 0
 - Military (mins): 0
 - AfterBurn (mins): 0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2033, add 567 T-7A Low-Altitude Operations in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	3.797934
SO _x	1.790216
NO _x	55.212263
CO	3.145426

Pollutant	Emissions Per Year (TONs)
PM 10	0.267696
PM 2.5	0.234234
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.225366
N ₂ O	0.043969

Pollutant	Emissions Per Year (TONs)
CO ₂	5359.671860
CO ₂ e	5378.410568

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	3.797934
SO _x	1.790216
NO _x	55.212263
CO	3.145426

Pollutant	Emissions Per Year (TONs)
PM 10	0.267696
PM 2.5	0.234234
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.225366
N ₂ O	0.043969

Pollutant	Emissions Per Year (TONs)
CO ₂	5359.671860
CO ₂ e	5378.410568

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
 Engine Model: F404-GE-102
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
 Flight Operation Cycle Type: LFP (Low Flight Pattern)
 Number of Annual Flight Operation Cycles for all Aircraft: 567

Number of Annual Trim Test(s) per Aircraft:

0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2033, remove 199 T-38C Low-Altitude Operations in IR-145 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.160145
SO _x	-0.228474
NO _x	-0.409972
CO	-6.617202

Pollutant	Emissions Per Year (TONs)
PM 10	-0.241286
PM 2.5	-0.215662
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.028762
N ₂ O	-0.005611

Pollutant	Emissions Per Year (TONs)
CO ₂	-684.020933
CO ₂ e	-686.412435

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.160145
SO _x	-0.228474

Pollutant	Emissions Per Year (TONs)
PM 10	-0.241286
PM 2.5	-0.215662

NO _x	-0.409972
CO	-6.617202

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.028762
N ₂ O	-0.005611

Pollutant	Emissions Per Year (TONs)
CO ₂	-684.020933
CO ₂ e	-686.412435

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 199
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Remove

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Low-Altitude Operations (IR-171)

- **Activity Description:**

In 2033, remove 103 T-38C Low-Altitude Operations in IR-171 with 14 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.074315
SO _x	-0.106022
NO _x	-0.190245
CO	-3.070675

Pollutant	Emissions Per Year (TONs)
PM 10	-0.111967
PM 2.5	-0.100077
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013347
N ₂ O	-0.002604

Pollutant	Emissions Per Year (TONs)
CO ₂	-317.416056
CO ₂ e	-318.525819

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.074315
SO _x	-0.106022
NO _x	-0.190245
CO	-3.070675

Pollutant	Emissions Per Year (TONs)
PM 10	-0.111967
PM 2.5	-0.100077
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013347

Pollutant	Emissions Per Year (TONs)
CO ₂	-317.416056

N ₂ O	-0.002604
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CO ₂ e	-318.525819
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21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 103
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2033, remove 117 T-38C Low-Altitude Operations in IR-175 with 14 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.100649
SO _x	-0.143593
NO _x	-0.257662
CO	-4.158827

Pollutant	Emissions Per Year (TONs)
PM 10	-0.151645
PM 2.5	-0.135541
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018077
N ₂ O	-0.003527

Pollutant	Emissions Per Year (TONs)
CO ₂	-429.898445
CO ₂ e	-431.401473

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.100649
SO _x	-0.143593
NO _x	-0.257662
CO	-4.158827

Pollutant	Emissions Per Year (TONs)
PM 10	-0.151645
PM 2.5	-0.135541
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018077
N ₂ O	-0.003527

Pollutant	Emissions Per Year (TONs)
CO ₂	-429.898445
CO ₂ e	-431.401473

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 117
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2033, add 18 T-38C Low-Altitude Operations in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.012987
SO _x	0.018528
NO _x	0.033247
CO	0.536623

Pollutant	Emissions Per Year (TONs)
PM 10	0.019567
PM 2.5	0.017489
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002332
N ₂ O	0.000455

Pollutant	Emissions Per Year (TONs)
CO ₂	55.470767
CO ₂ e	55.664706

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.012987
SO _x	0.018528
NO _x	0.033247
CO	0.536623

Pollutant	Emissions Per Year (TONs)
PM 10	0.019567
PM 2.5	0.017489
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002332
N ₂ O	0.000455

Pollutant	Emissions Per Year (TONs)
CO ₂	55.470767
CO ₂ e	55.664706

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49

Flight Operation Cycle Type: LFP (Low Flight Pattern)

Number of Annual Flight Operation Cycles for all Aircraft: 18

Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins): 0

Climb Out [Intermediate] (mins): 0

Takeoff [Military] (mins): 26

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0

Intermediate (mins): 0

Military (mins): 0

AfterBurn (mins): 0

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Low-Altitude Operations (IR-185)

- **Activity Description:**

In 2033, remove 151 T-38C Low-Altitude Operations in IR-185 with 14 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.129898
SO _x	-0.185321
NO _x	-0.332538
CO	-5.367375

Pollutant	Emissions Per Year (TONs)
PM 10	-0.195713
PM 2.5	-0.174929
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.023330
N ₂ O	-0.004552

Pollutant	Emissions Per Year (TONs)
CO ₂	-554.826198
CO ₂ e	-556.766004

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.129898
SO _x	-0.185321
NO _x	-0.332538
CO	-5.367375

Pollutant	Emissions Per Year (TONs)
PM 10	-0.195713
PM 2.5	-0.174929
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.023330
N ₂ O	-0.004552

Pollutant	Emissions Per Year (TONs)
CO ₂	-554.826198
CO ₂ e	-556.766004

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 151
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- **Activity Description:**

In 2033, remove 525 T-38C Low-Altitude Operations in Vance 1E MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.509906
SO _x	-0.727466
NO _x	-1.305360
CO	-21.069326

Pollutant	Emissions Per Year (TONs)
PM 10	-0.768259
PM 2.5	-0.686674
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091579
N ₂ O	-0.017867

Pollutant	Emissions Per Year (TONs)
CO ₂	-2177.938770
CO ₂ e	-2185.553370

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.509906
SO _x	-0.727466
NO _x	-1.305360
CO	-21.069326

Pollutant	Emissions Per Year (TONs)
PM 10	-0.768259
PM 2.5	-0.686674
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091579
N ₂ O	-0.017867

Pollutant	Emissions Per Year (TONs)
CO ₂	-2177.938770
CO ₂ e	-2185.553370

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23

Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	525
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2034, add 73 T-7A Low-Altitude Operations in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.405151
SO _x	0.190974
NO _x	5.889864
CO	0.335544

Pollutant	Emissions Per Year (TONs)
PM 10	0.028557
PM 2.5	0.024987
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.024041
N ₂ O	0.004690

Pollutant	Emissions Per Year (TONs)
CO ₂	571.752347
CO ₂ e	573.751331

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.405151
SO _x	0.190974
NO _x	5.889864
CO	0.335544

Pollutant	Emissions Per Year (TONs)
PM 10	0.028557
PM 2.5	0.024987
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.024041
N ₂ O	0.004690

Pollutant	Emissions Per Year (TONs)
CO ₂	571.752347
CO ₂ e	573.751331

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:

Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		73
Number of Annual Trim Test(s) per Aircraft:		0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		29
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2034, add 38 T-7A Low-Altitude Operations in IR-171 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.189083
SO _x	0.089127
NO _x	2.748789
CO	0.156598

Pollutant	Emissions Per Year (TONs)
PM 10	0.013327
PM 2.5	0.011662
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011220
N ₂ O	0.002189

Pollutant	Emissions Per Year (TONs)
CO ₂	266.835767
CO ₂ e	267.768689

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	0.189083
SO _x	0.089127
NO _x	2.748789
CO	0.156598

PM 10	0.013327
PM 2.5	0.011662
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011220
N ₂ O	0.002189

Pollutant	Emissions Per Year (TONs)
CO ₂	266.835767
CO ₂ e	267.768689

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 38
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2034, add 43 T-7A Low-Altitude Operations in IR-175 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.255109
SO _x	0.120250
NO _x	3.708639
CO	0.211280

Pollutant	Emissions Per Year (TONs)
PM 10	0.017981
PM 2.5	0.015734
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015138
N ₂ O	0.002953

Pollutant	Emissions Per Year (TONs)
CO ₂	360.012224
CO ₂ e	361.270914

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.255109
SO _x	0.120250
NO _x	3.708639
CO	0.211280

Pollutant	Emissions Per Year (TONs)
PM 10	0.017981
PM 2.5	0.015734
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015138
N ₂ O	0.002953

Pollutant	Emissions Per Year (TONs)
CO ₂	360.012224
CO ₂ e	361.270914

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

28.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 68
- Flight Operation Cycle Type:** LFP (Low Flight Pattern)
- Number of Annual Flight Operation Cycles for all Aircraft:** 43
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 31
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

28.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

29. Aircraft

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

- County(s):** Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
- Regulatory Area(s):** NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2034, add 40 T-7A Low-Altitude Operations in IR-181 with 68 aircraft.

- Activity Start Date

- Start Month:** 1
- Start Year:** 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.199035
SO _x	0.093818
NO _x	2.893462
CO	0.164840

Pollutant	Emissions Per Year (TONs)
PM 10	0.014029
PM 2.5	0.012275
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011811
N ₂ O	0.002304

Pollutant	Emissions Per Year (TONs)
CO ₂	280.879755
CO ₂ e	281.861778

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.199035
SO _x	0.093818
NO _x	2.893462
CO	0.164840

Pollutant	Emissions Per Year (TONs)
PM 10	0.014029
PM 2.5	0.012275
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011811
N ₂ O	0.002304

Pollutant	Emissions Per Year (TONs)
CO ₂	280.879755
CO ₂ e	281.861778

29.2 Aircraft & Engines

29.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

29.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

29.3 Flight Operations

29.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	40
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

29.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

30. Aircraft

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2034, add 56 T-7A Low-Altitude Operations in IR-185 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.332236
SO _x	0.156604
NO _x	4.829856
CO	0.275155

Pollutant	Emissions Per Year (TONs)
PM 10	0.023417
PM 2.5	0.020490
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.019715
N ₂ O	0.003846

Pollutant	Emissions Per Year (TONs)
CO ₂	468.853129
CO ₂ e	470.492353

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.332236
SO _x	0.156604
NO _x	4.829856
CO	0.275155

Pollutant	Emissions Per Year (TONs)
PM 10	0.023417
PM 2.5	0.020490
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.019715
N ₂ O	0.003846

Pollutant	Emissions Per Year (TONs)
CO ₂	468.853129
CO ₂ e	470.492353

30.2 Aircraft & Engines

30.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

30.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

30.3 Flight Operations

30.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 56
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

30.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

31. Aircraft

31.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2034, add 193 T-7A Low-Altitude Operations in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.292771
SO _x	0.609368
NO _x	18.793592
CO	1.070665

Pollutant	Emissions Per Year (TONs)
PM 10	0.091120
PM 2.5	0.079730
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.076712
N ₂ O	0.014967

Pollutant	Emissions Per Year (TONs)
CO ₂	1824.368023
CO ₂ e	1830.746454

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.292771
SO _x	0.609368
NO _x	18.793592
CO	1.070665

Pollutant	Emissions Per Year (TONs)
PM 10	0.091120
PM 2.5	0.079730
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.076712
N ₂ O	0.014967

Pollutant	Emissions Per Year (TONs)
CO ₂	1824.368023
CO ₂ e	1830.746454

31.2 Aircraft & Engines

31.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

31.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

31.3 Flight Operations

31.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 68
- Flight Operation Cycle Type:** LFP (Low Flight Pattern)
- Number of Annual Flight Operation Cycles for all Aircraft:** 193
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 35
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

31.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

32. Aircraft

32.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

- County(s):** Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
- Regulatory Area(s):** NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2034, remove 77 T-38C Low-Altitude Operations in IR-145 with 49 aircraft.

- Activity Start Date

- Start Month:** 1
- Start Year:** 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.061966
SO _x	-0.088404
NO _x	-0.158632
CO	-2.560425

Pollutant	Emissions Per Year (TONs)
PM 10	-0.093362
PM 2.5	-0.083447
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011129
N ₂ O	-0.002171

Pollutant	Emissions Per Year (TONs)
CO ₂	-264.671416
CO ₂ e	-265.596771

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.061966
SO _x	-0.088404
NO _x	-0.158632
CO	-2.560425

Pollutant	Emissions Per Year (TONs)
PM 10	-0.093362
PM 2.5	-0.083447
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011129
N ₂ O	-0.002171

Pollutant	Emissions Per Year (TONs)
CO ₂	-264.671416
CO ₂ e	-265.596771

32.2 Aircraft & Engines

32.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

32.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

32.3 Flight Operations

32.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	77
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

32.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

33. Aircraft

33.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2034, remove 40 T-38C Low-Altitude Operations in IR-171 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.028860
SO _x	-0.041174
NO _x	-0.073882
CO	-1.192495

Pollutant	Emissions Per Year (TONs)
PM 10	-0.043482
PM 2.5	-0.038865
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005183
N ₂ O	-0.001011

Pollutant	Emissions Per Year (TONs)
CO ₂	-123.268371
CO ₂ e	-123.699347

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.028860
SO _x	-0.041174
NO _x	-0.073882
CO	-1.192495

Pollutant	Emissions Per Year (TONs)
PM 10	-0.043482
PM 2.5	-0.038865
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005183
N ₂ O	-0.001011

Pollutant	Emissions Per Year (TONs)
CO ₂	-123.268371
CO ₂ e	-123.699347

33.2 Aircraft & Engines

33.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

33.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

33.3 Flight Operations

33.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		40
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		26
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

33.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

34. Aircraft

34.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2034, remove 45 T-38C Low-Altitude Operations in IR-175 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.038711
SO _x	-0.055228
NO _x	-0.099101
CO	-1.599549

Pollutant	Emissions Per Year (TONs)
PM 10	-0.058325
PM 2.5	-0.052131
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006953
N ₂ O	-0.001356

Pollutant	Emissions Per Year (TONs)
CO ₂	-165.345556
CO ₂ e	-165.923644

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.038711
SO _x	-0.055228
NO _x	-0.099101
CO	-1.599549

Pollutant	Emissions Per Year (TONs)
PM 10	-0.058325
PM 2.5	-0.052131
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006953
N ₂ O	-0.001356

Pollutant	Emissions Per Year (TONs)
CO ₂	-165.345556
CO ₂ e	-165.923644

34.2 Aircraft & Engines

34.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

34.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

34.3 Flight Operations

34.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	45
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

34.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

35. Aircraft

35.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2034, remove 42 T-38C Low-Altitude Operations in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.030303
SO _x	-0.043232
NO _x	-0.077576
CO	-1.252120

Pollutant	Emissions Per Year (TONs)
PM 10	-0.045657
PM 2.5	-0.040808
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005442
N ₂ O	-0.001062

Pollutant	Emissions Per Year (TONs)
CO ₂	-129.431790
CO ₂ e	-129.884315

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.030303
SO _x	-0.043232
NO _x	-0.077576
CO	-1.252120

Pollutant	Emissions Per Year (TONs)
PM 10	-0.045657
PM 2.5	-0.040808
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005442
N ₂ O	-0.001062

Pollutant	Emissions Per Year (TONs)
CO ₂	-129.431790
CO ₂ e	-129.884315

35.2 Aircraft & Engines

35.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

35.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

35.3 Flight Operations

35.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 42
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

35.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{\text{TRIM}} = AEPS_{\text{IDLE}} + AEPS_{\text{APPROACH}} + AEPS_{\text{INTERMEDIATE}} + AEPS_{\text{MILITARY}} + AEPS_{\text{AFTERBURN}}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

36. Aircraft

36.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2034, remove 58 T-38C Low-Altitude Operations in IR-185 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.049895
SO _x	-0.071183
NO _x	-0.127730
CO	-2.061641

Pollutant	Emissions Per Year (TONs)
PM 10	-0.075174
PM 2.5	-0.067191
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008961
N ₂ O	-0.001748

Pollutant	Emissions Per Year (TONs)
CO ₂	-213.112049
CO ₂ e	-213.857141

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.049895
SO _x	-0.071183
NO _x	-0.127730
CO	-2.061641

Pollutant	Emissions Per Year (TONs)
PM 10	-0.075174
PM 2.5	-0.067191
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008961	CO ₂	-213.112049
N ₂ O	-0.001748	CO ₂ e	-213.857141

36.2 Aircraft & Engines

36.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

36.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

36.3 Flight Operations

36.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 58
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

36.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

37. Aircraft

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2034, remove 203 T-38C Low-Altitude Operations in Vance 1E MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.197164
SO _x	-0.281287
NO _x	-0.504739
CO	-8.146806

Pollutant	Emissions Per Year (TONs)
PM 10	-0.297060
PM 2.5	-0.265514
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035411
N ₂ O	-0.006909

Pollutant	Emissions Per Year (TONs)
CO ₂	-842.136324
CO ₂ e	-845.080636

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.197164
SO _x	-0.281287
NO _x	-0.504739
CO	-8.146806

Pollutant	Emissions Per Year (TONs)
PM 10	-0.297060
PM 2.5	-0.265514
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035411
N ₂ O	-0.006909

Pollutant	Emissions Per Year (TONs)
CO ₂	-842.136324
CO ₂ e	-845.080636

37.2 Aircraft & Engines

37.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

37.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

37.3 Flight Operations

37.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 203
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

37.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

SUA ROI: Alternative 1 GHG Report (Destination Cycles)

AIR CONFORMITY APPLICABILITY MODEL REPORT GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to estimate GHG emissions associated with the action. The analysis was performed in accordance with the Department of the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention* and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the GHG emissions analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Vance AFB T-7A EIS: Alternative 1, SUA Destination Cycle

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2032

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

f. Point of Contact:

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action's start through the action's "steady state" (SS, net gain/loss in emission stabilized and the action is fully implemented) of emissions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO₂ equivalents (CO₂e). The CO₂e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO₂. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO₂e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO₂e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO₂e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected steady state of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	CO₂	CH₄	N₂O	CO₂e	Threshold	Exceedance
2032	3,650	0.15345765	0.02993962	3,662	68,039	No
2033	17,624	0.7410476	0.14457855	17,685	68,039	No
2034	23,892	1.00461123	0.19599988	23,975	68,039	No
2035 [SS Year]	23,892	1.00461123	0.19599988	23,975	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. <https://statesummaries.ncics.org/downloads/>).

State's Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2032	94,683,042	1,117,798	43,525	137,515,492
2033	94,683,042	1,117,798	43,525	137,515,492
2034	94,683,042	1,117,798	43,525	137,515,492
2035 [SS Year]	94,683,042	1,117,798	43,525	137,515,492

U.S. Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2032	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2033	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2034	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2035 [SS Year]	5,136,454,179	25,626,912	1,500,708	6,251,695,230

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (Rtba.e., global, national, and regional) and the degree (intensity) of the proposed action’s effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative’s annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action’s surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area’s ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action’s GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action’s net change in GHG emissions is compared relative to the state (where the action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action’s net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2032-2035	State Total	378,732,166	4,471,190	174,100	550,061,969
2032-2035	U.S. Total	20,545,816,716	102,507,647	6,002,831	25,006,780,918
2032-2035	Action	69,057	2.903728	0.566518	69,298
Percent of State Totals		0.01823361%	0.00006494%	0.00032540%	0.01259822%
Percent of U.S. Totals		0.00033611%	0.00000283%	0.00000944%	0.00027712%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00003713%.*

* Global value based on the U.S. emitting 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, <https://www.c2es.org/content/international-emissions>).

SUA ROI: Alternative 1 ACAM Detail Report (Destination Cycles)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Action Title:** Vance AFB T-7A EIS: Alternative 1, SUA Destination Cycle

- **Project Number/s (if applicable):**

- **Projected Action Start Date:** 1 / 2032

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

- Point of Contact

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-145)
3.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-171)
4.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-175)
5.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-181)
6.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-185)
7.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1A MOA)
8.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1C MOA)
9.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1E MOA)
10.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-145)
11.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-171)
12.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-175)
13.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-181)
14.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-185)
15.	Aircraft	2032: Remove T-38C MOA Destination Cycles (Vance 1A MOA)
16.	Aircraft	2032: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
17.	Aircraft	2032: Remove T-38C MOA Destination Cycles (Vance 1E MOA)
18.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-145)
19.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-171)
20.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-175)
21.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-181)
22.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-185)
23.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1A MOA)
24.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1C MOA)
25.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1E MOA)
26.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-145)
27.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-171)
28.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-175)
29.	Aircraft	2033: Add T-38C MTR Destination Cycles (IR-181)
30.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-185)
31.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1A MOA)
32.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
33.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1E MOA)
34.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-145)
35.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-171)
36.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-175)
37.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-181)
38.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-185)
39.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1A MOA)
40.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1C MOA)
41.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1E MOA)
42.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-145)
43.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-171)
44.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-175)
45.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-181)
46.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-185)
47.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1A MOA)
48.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
49.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2032, add 46 T-7A Destination Cycles in IR-145 with 24 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015149
N ₂ O	0.002956

Pollutant	Emissions Per Year (TONs)
CO ₂	360.282301
CO ₂ e	361.541935

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015149
N ₂ O	0.002956

Pollutant	Emissions Per Year (TONs)
CO ₂	360.282301
CO ₂ e	361.541935

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

2.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 24
- Flight Operation Cycle Type:** DC (Destination Cycle)
- Number of Annual Flight Operation Cycles for all Aircraft:** 46
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 29
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

2.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Destination Cycles (IR-171)

- Activity Description:

In 2032, add 24 T-7A Destination Cycles in IR-171 with 24 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		24
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AE_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AE_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AE_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AE_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AE_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4. Aircraft

4.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2032, add 27 T-7A Destination Cycles in IR-175 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009505

Pollutant	Emissions Per Year (TONs)
CO ₂	226.054187

N ₂ O	0.001854
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CO _{2e}	226.844527
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- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009505
N ₂ O	0.001854

Pollutant	Emissions Per Year (TONs)
CO ₂	226.054187
CO _{2e}	226.844527

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 27
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2032, add 25 T-7A Destination Cycles in IR-181 with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007382
N ₂ O	0.001440

Pollutant	Emissions Per Year (TONs)
CO ₂	175.549847
CO ₂ e	176.163611

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007382
N ₂ O	0.001440

Pollutant	Emissions Per Year (TONs)
CO ₂	175.549847
CO ₂ e	176.163611

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	25
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6. Aircraft

6.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Destination Cycles (IR-185)

- **Activity Description:**

In 2032, add 35 T-7A Destination Cycles in IR-185 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.012322
N ₂ O	0.002404

Pollutant	Emissions Per Year (TONs)
CO ₂	293.033206
CO ₂ e	294.057721

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.012322
N ₂ O	0.002404

Pollutant	Emissions Per Year (TONs)
CO ₂	293.033206
CO ₂ e	294.057721

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		35
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2032, add 466 T-7A Destination Cycles in Vance 1A MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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CH ₄	0.059997
N ₂ O	0.011705

CO ₂	1426.851002
CO ₂ e	1431.839617

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.059997
N ₂ O	0.011705

Pollutant	Emissions Per Year (TONs)
CO ₂	1426.851002
CO ₂ e	1431.839617

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 466
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.6
Climb Out [Intermediate] (mins): 3
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2032, add 872 T-7A Destination Cycles in Vance 1C MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.126713
N ₂ O	0.024722

Pollutant	Emissions Per Year (TONs)
CO ₂	3013.504677
CO ₂ e	3024.040617

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.126713
N ₂ O	0.024722

Pollutant	Emissions Per Year (TONs)
CO ₂	3013.504677
CO ₂ e	3024.040617

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	872
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	31.92
Climb Out [Intermediate] (mins):	3.04
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2032, add 116 T-7A Destination Cycles in Vance 1E MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	116
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2032, remove 35 T-38C Destination Cycles in IR-145 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

CH ₄	-0.005059
N ₂ O	-0.000987

CO ₂	-120.305189
CO ₂ e	-120.725805

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005059
N ₂ O	-0.000987

Pollutant	Emissions Per Year (TONs)
CO ₂	-120.305189
CO ₂ e	-120.725805

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)

Number of Annual Flight Operation Cycles for all Aircraft: 35
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

10.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2032, remove 30 T-38C Destination Cycles in IR-171 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003887
N ₂ O	-0.000758

Pollutant	Emissions Per Year (TONs)
CO ₂	-92.451278
CO ₂ e	-92.774510

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000

SO _x	0.000000
NO _x	0.000000
CO	0.000000

PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003887
N ₂ O	-0.000758

Pollutant	Emissions Per Year (TONs)
CO ₂	-92.451278
CO ₂ e	-92.774510

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 30
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{\text{TRIM}} = AEPS_{\text{IDLE}} + AEPS_{\text{APPROACH}} + AEPS_{\text{INTERMEDIATE}} + AEPS_{\text{MILITARY}} + AEPS_{\text{AFTERBURN}}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2032, remove 23 T-38C Destination Cycles in IR-175 with 63 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003554
N ₂ O	-0.000693

Pollutant	Emissions Per Year (TONs)
CO ₂	-84.509951
CO ₂ e	-84.805418

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

CH ₄	-0.003554
N ₂ O	-0.000693

CO ₂	-84.509951
CO ₂ e	-84.805418

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 23
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2032, remove 149 T-38C Destination Cycles in IR-181 with 63 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019308
N ₂ O	-0.003767

Pollutant	Emissions Per Year (TONs)
CO ₂	-459.174683
CO ₂ e	-460.780068

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019308
N ₂ O	-0.003767

Pollutant	Emissions Per Year (TONs)
CO ₂	-459.174683
CO ₂ e	-460.780068

13.2 Aircraft & Engines

13.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

13.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 149
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2032, remove 21 T-38C Destination Cycles in IR-185 with 63 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

14.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63

Flight Operation Cycle Type: DC (Destination Cycle)

Number of Annual Flight Operation Cycles for all Aircraft: 21

Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins): 0

Climb Out [Intermediate] (mins): 0

Takeoff [Military] (mins): 31

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0

Intermediate (mins): 0

Military (mins): 0

AfterBurn (mins): 0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MOA Destination Cycles (Vance 1A MOA)

- **Activity Description:**

In 2032, remove 97 T-38C Destination Cycles in Vance 1A MOA with 63 aircraft.

- **Activity Start Date**

Start Month: 1

Start Year: 2032

- **Activity End Date**

Indefinite: Yes

End Month: N/A

End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005318
N ₂ O	-0.001038

Pollutant	Emissions Per Year (TONs)
CO ₂	-126.484144
CO ₂ e	-126.926364

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005318
N ₂ O	-0.001038

Pollutant	Emissions Per Year (TONs)
CO ₂	-126.484144
CO ₂ e	-126.926364

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

15.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	97
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3
Climb Out [Intermediate] (mins):	3.6
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2032, remove 634 T-38C Destination Cycles in Vance 1C MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.059383
N ₂ O	-0.011586

Pollutant	Emissions Per Year (TONs)
CO ₂	-1412.241257
CO ₂ e	-1417.178793

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.059383
N ₂ O	-0.011586

Pollutant	Emissions Per Year (TONs)
CO ₂	-1412.241257
CO ₂ e	-1417.178793

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

16.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17

Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	634
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.04
Climb Out [Intermediate] (mins):	31.92
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2032, remove 88 T-38C Destination Cycles in Vance 1E MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015350
N ₂ O	-0.002995

Pollutant	Emissions Per Year (TONs)
CO ₂	-365.064022
CO ₂ e	-366.340374

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015350
N ₂ O	-0.002995

Pollutant	Emissions Per Year (TONs)
CO ₂	-365.064022
CO ₂ e	-366.340374

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64

Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	88
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2033, add 225 T-7A Destination Cycles in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000

NO _x	0.000000
CO	0.000000

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.074100
N ₂ O	0.014457

Pollutant	Emissions Per Year (TONs)
CO ₂	1762.250385
CO ₂ e	1768.411638

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.074100
N ₂ O	0.014457

Pollutant	Emissions Per Year (TONs)
CO ₂	1762.250385
CO ₂ e	1768.411638

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 225
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-171)

- **Activity Description:**

In 2033, add 116 T-7A Destination Cycles in IR-171 with 68 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.034251
N ₂ O	0.006682

Pollutant	Emissions Per Year (TONs)
CO ₂	814.551289
CO ₂ e	817.399157

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.034251

Pollutant	Emissions Per Year (TONs)
CO ₂	814.551289

N ₂ O	0.006682
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CO ₂ e	817.399157
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19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 116
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-175)

- **Activity Description:**

In 2033, add 132 T-7A Destination Cycles in IR-175 with 68 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046470
N ₂ O	0.009066

Pollutant	Emissions Per Year (TONs)
CO ₂	1105.153805
CO ₂ e	1109.017689

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046470
N ₂ O	0.009066

Pollutant	Emissions Per Year (TONs)
CO ₂	1105.153805
CO ₂ e	1109.017689

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		68
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		132
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2033, add 124 T-7A Destination Cycles in IR-181 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.036613
N ₂ O	0.007143

Pollutant	Emissions Per Year (TONs)
CO ₂	870.727240
CO ₂ e	873.771513

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.036613
N ₂ O	0.007143

Pollutant	Emissions Per Year (TONs)
CO ₂	870.727240
CO ₂ e	873.771513

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 124
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2033, add 171 T-7A Destination Cycles in IR-185 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.060200
N ₂ O	0.011745

Pollutant	Emissions Per Year (TONs)
CO ₂	1431.676520
CO ₂ e	1436.682006

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.060200
N ₂ O	0.011745

Pollutant	Emissions Per Year (TONs)
CO ₂	1431.676520
CO ₂ e	1436.682006

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 171
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2033, add 2,280 T-7A Destination Cycles in Vance 1A MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.293548
N ₂ O	0.057271

Pollutant	Emissions Per Year (TONs)
CO ₂	6981.159407
CO ₂ e	7005.567227

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.293548
N ₂ O	0.057271

Pollutant	Emissions Per Year (TONs)
CO ₂	6981.159407
CO ₂ e	7005.567227

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		68
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		2280
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.6
Climb Out [Intermediate] (mins):	3
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2033, add 4,263 T-7A Destination Cycles in Vance 1C MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.619472
N ₂ O	0.120859

Pollutant	Emissions Per Year (TONs)
CO ₂	14732.305547
CO ₂ e	14783.813245

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.619472
N ₂ O	0.120859

Pollutant	Emissions Per Year (TONs)
CO ₂	14732.305547
CO ₂ e	14783.813245

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 4263
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	31.92
Climb Out [Intermediate] (mins):	3.04
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2033, add 567 T-7A Destination Cycles in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.225366
N ₂ O	0.043969

Pollutant	Emissions Per Year (TONs)
CO ₂	5359.671860
CO ₂ e	5378.410568

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.225366
N ₂ O	0.043969

Pollutant	Emissions Per Year (TONs)
CO ₂	5359.671860
CO ₂ e	5378.410568

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 567
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2033, remove 209 T-38C Destination Cycles in IR-145 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.030207
N ₂ O	-0.005893

Pollutant	Emissions Per Year (TONs)
CO ₂	-718.393844
CO ₂ e	-720.905522

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.030207
N ₂ O	-0.005893

Pollutant	Emissions Per Year (TONs)
CO ₂	-718.393844
CO ₂ e	-720.905522

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 209
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2033, remove 108 T-38C Destination Cycles in IR-171 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013995
N ₂ O	-0.002730

Pollutant	Emissions Per Year (TONs)
CO ₂	-332.824602
CO ₂ e	-333.988237

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013995
N ₂ O	-0.002730

Pollutant	Emissions Per Year (TONs)
CO ₂	-332.824602
CO ₂ e	-333.988237

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	108
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2033, remove 122 T-38C Destination Cycles in IR-175 with 14 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018849
N ₂ O	-0.003677

Pollutant	Emissions Per Year (TONs)
CO ₂	-448.270173
CO ₂ e	-449.837434

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018849
N ₂ O	-0.003677

Pollutant	Emissions Per Year (TONs)
CO ₂	-448.270173
CO ₂ e	-449.837434

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

28.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	122
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

28.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

29. Aircraft

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2033, add 13 T-38C Destination Cycles in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001685
N ₂ O	0.000329

Pollutant	Emissions Per Year (TONs)
CO ₂	40.062221
CO ₂ e	40.202288

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001685
N ₂ O	0.000329

Pollutant	Emissions Per Year (TONs)
CO ₂	40.062221
CO ₂ e	40.202288

29.2 Aircraft & Engines

29.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

29.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64

After Burn	7695.00	0.13	0.03	3203.44	3214.64
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29.3 Flight Operations

29.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	13
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

29.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

30. Aircraft

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2033, remove 158 T-38C Destination Cycles in IR-185 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.024411
N ₂ O	-0.004763

Pollutant	Emissions Per Year (TONs)
CO ₂	-580.546617
CO ₂ e	-582.576349

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.024411
N ₂ O	-0.004763

Pollutant	Emissions Per Year (TONs)
CO ₂	-580.546617
CO ₂ e	-582.576349

30.2 Aircraft & Engines

30.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

30.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

30.3 Flight Operations

30.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	158
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

30.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

31. Aircraft

31.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2033, remove 2,111 T-38C Destination Cycles in Vance 1A MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.115745
N ₂ O	-0.022582

Pollutant	Emissions Per Year (TONs)
CO ₂	-2752.660092
CO ₂ e	-2762.284057

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.115745
N ₂ O	-0.022582

Pollutant	Emissions Per Year (TONs)
CO ₂	-2752.660092
CO ₂ e	-2762.284057

31.2 Aircraft & Engines

31.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

31.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

31.3 Flight Operations

31.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 2111
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3
Climb Out [Intermediate] (mins):	3.6
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

31.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

32. Aircraft

32.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2033, remove 4,796 T-38C Destination Cycles in Vance 1C MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.449210
N ₂ O	-0.087641

Pollutant	Emissions Per Year (TONs)
CO ₂	-10683.137329
CO ₂ e	-10720.488157

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	-0.449210	CO ₂	-10683.137329
N ₂ O	-0.087641	CO ₂ e	-10720.488157

32.2 Aircraft & Engines

32.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

32.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

32.3 Flight Operations

32.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 4796
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.04
Climb Out [Intermediate] (mins): 31.92
Takeoff [Military] (mins): 3.04

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

32.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

33. Aircraft

33.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2033, remove 525 T-38C Destination Cycles in Vance 1E MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091579
N ₂ O	-0.017867

Pollutant	Emissions Per Year (TONs)
CO ₂	-2177.938770
CO ₂ e	-2185.553370

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091579
N ₂ O	-0.017867

Pollutant	Emissions Per Year (TONs)
CO ₂	-2177.938770
CO ₂ e	-2185.553370

33.2 Aircraft & Engines

33.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

33.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

33.3 Flight Operations

33.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 525
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

33.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

34. Aircraft

34.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2034, add 77 T-7A Destination Cycles in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.025359
N ₂ O	0.004947

Pollutant	Emissions Per Year (TONs)
CO ₂	603.081243
CO ₂ e	605.189761

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.025359
N ₂ O	0.004947

Pollutant	Emissions Per Year (TONs)
CO ₂	603.081243
CO ₂ e	605.189761

34.2 Aircraft & Engines

34.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

34.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

34.3 Flight Operations

34.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 68
- Flight Operation Cycle Type:** DC (Destination Cycle)
- Number of Annual Flight Operation Cycles for all Aircraft:** 77
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 29
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

34.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

35. Aircraft

35.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

- County(s):** Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
- Regulatory Area(s):** NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-171)

- Activity Description:

In 2034, add 40 T-7A Destination Cycles in IR-171 with 68 aircraft.

- Activity Start Date

- Start Month:** 1
- Start Year:** 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011811
N ₂ O	0.002304

Pollutant	Emissions Per Year (TONs)
CO ₂	280.879755
CO ₂ e	281.861778

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011811
N ₂ O	0.002304

Pollutant	Emissions Per Year (TONs)
CO ₂	280.879755
CO ₂ e	281.861778

35.2 Aircraft & Engines

35.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

35.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

35.3 Flight Operations

35.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	40
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

35.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

36. Aircraft

36.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2034, add 45 T-7A Destination Cycles in IR-175 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015842
N ₂ O	0.003091

Pollutant	Emissions Per Year (TONs)
CO ₂	376.756979
CO ₂ e	378.074212

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015842
N ₂ O	0.003091

Pollutant	Emissions Per Year (TONs)
CO ₂	376.756979
CO ₂ e	378.074212

36.2 Aircraft & Engines

36.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

36.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

36.3 Flight Operations

36.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 45
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

36.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

37. Aircraft

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2034, add 42 T-7A Destination Cycles in IR-181 with 68 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.012401
N ₂ O	0.002419

Pollutant	Emissions Per Year (TONs)
CO ₂	294.923743
CO ₂ e	295.954867

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.012401
N ₂ O	0.002419

Pollutant	Emissions Per Year (TONs)
CO ₂	294.923743
CO ₂ e	295.954867

37.2 Aircraft & Engines

37.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

37.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

37.3 Flight Operations

37.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 42
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

37.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

38. Aircraft

38.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2034, add 58 T-7A Destination Cycles in IR-185 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.020419
N ₂ O	0.003984

Pollutant	Emissions Per Year (TONs)
CO ₂	485.597884
CO ₂ e	487.295651

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.020419
N ₂ O	0.003984

Pollutant	Emissions Per Year (TONs)
CO ₂	485.597884
CO ₂ e	487.295651

38.2 Aircraft & Engines

38.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

38.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

38.3 Flight Operations

38.3.1 Flight Operations Assumptions

- Flight Operations		
Number of Aircraft:		68
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		58
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

38.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

39. Aircraft

39.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2034, add 777 T-7A Destination Cycles in Vance 1A MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.100038
N ₂ O	0.019517

Pollutant	Emissions Per Year (TONs)
CO ₂	2379.105640
CO ₂ e	2387.423568

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.100038
N ₂ O	0.019517

Pollutant	Emissions Per Year (TONs)
CO ₂	2379.105640
CO ₂ e	2387.423568

39.2 Aircraft & Engines

39.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

39.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

39.3 Flight Operations

39.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 777
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.6
Climb Out [Intermediate] (mins): 3
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

39.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

40. Aircraft

40.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2034, add 1,453 T-7A Destination Cycles in Vance 1C MOA with 68 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.211141
N ₂ O	0.041194

Pollutant	Emissions Per Year (TONs)
CO ₂	5021.355843
CO ₂ e	5038.911716

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.211141
N ₂ O	0.041194

Pollutant	Emissions Per Year (TONs)
CO ₂	5021.355843
CO ₂ e	5038.911716

40.2 Aircraft & Engines

40.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
 - Is Aircraft & Engine a Surrogate?** No
 - Original Aircraft Name:**
 - Original Engine Name:**

40.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

40.3 Flight Operations

40.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	1453
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	31.92
Climb Out [Intermediate] (mins):	3.04
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

40.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AE_{PS_{POL}} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AE_{PS_{POL}}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PS_{IDLE}} + AE_{PS_{APPROACH}} + AE_{PS_{INTERMEDIATE}} + AE_{PS_{MILITARY}} + AE_{PS_{AFTERBURN}}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AE_{PS_{IDLE}}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AE_{PS_{APPROACH}}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AE_{PS_{INTERMEDIATE}}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AE_{PS_{MILITARY}}$: Aircraft Emissions for Military Power Setting (TONs)
 $AE_{PS_{AFTERBURN}}$: Aircraft Emissions for After Burner Power Setting (TONs)

41. Aircraft

41.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2034, add 193 T-7A Destination Cycles in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.076712
N ₂ O	0.014967

Pollutant	Emissions Per Year (TONs)
CO ₂	1824.368023
CO ₂ e	1830.746454

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.076712
N ₂ O	0.014967

Pollutant	Emissions Per Year (TONs)
CO ₂	1824.368023
CO ₂ e	1830.746454

41.2 Aircraft & Engines

41.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

41.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

41.3 Flight Operations

41.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	193
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

41.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

42. Aircraft

42.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2034, remove 81 T-38C Destination Cycles in IR-145 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011707
N ₂ O	-0.002284

Pollutant	Emissions Per Year (TONs)
CO ₂	-278.420581
CO ₂ e	-279.394006

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011707
N ₂ O	-0.002284

Pollutant	Emissions Per Year (TONs)
CO ₂	-278.420581
CO ₂ e	-279.394006

42.2 Aircraft & Engines

42.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

42.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

42.3 Flight Operations

42.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 81
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

42.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

43. Aircraft

43.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2034, remove 42 T-38C Destination Cycles in IR-171 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005442
N ₂ O	-0.001062

Pollutant	Emissions Per Year (TONs)
CO ₂	-129.431790
CO ₂ e	-129.884315

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005442	CO ₂	-129.431790
N ₂ O	-0.001062	CO ₂ e	-129.884315

43.2 Aircraft & Engines

43.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

43.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

43.3 Flight Operations

43.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 42
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

43.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

44. Aircraft

44.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2034, remove 47 T-38C Destination Cycles in IR-175 with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007262
N ₂ O	-0.001417

Pollutant	Emissions Per Year (TONs)
CO ₂	-172.694247
CO ₂ e	-173.298028

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007262
N ₂ O	-0.001417

Pollutant	Emissions Per Year (TONs)
CO ₂	-172.694247
CO ₂ e	-173.298028

44.2 Aircraft & Engines

44.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

44.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

44.3 Flight Operations

44.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 47
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

44.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

45. Aircraft

45.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2034, remove 44 T-38C Destination Cycles in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005702
N ₂ O	-0.001112

Pollutant	Emissions Per Year (TONs)
CO ₂	-135.595208
CO ₂ e	-136.069282

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005702
N ₂ O	-0.001112

Pollutant	Emissions Per Year (TONs)
CO ₂	-135.595208
CO ₂ e	-136.069282

45.2 Aircraft & Engines

45.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

45.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gases Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

45.3 Flight Operations

45.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 44
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

45.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

46. Aircraft

46.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2034, remove 61 T-38C Destination Cycles in IR-185 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.009425
N ₂ O	-0.001839

Pollutant	Emissions Per Year (TONs)
CO ₂	-224.135086
CO ₂ e	-224.918717

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.009425
N ₂ O	-0.001839

Pollutant	Emissions Per Year (TONs)
CO ₂	-224.135086
CO ₂ e	-224.918717

46.2 Aircraft & Engines

46.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

46.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

46.3 Flight Operations

46.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 61
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

46.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

47. Aircraft

47.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2034, remove 816 T-38C Destination Cycles in Vance 1A MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.044741
N ₂ O	-0.008729

Pollutant	Emissions Per Year (TONs)
CO ₂	-1064.031566
CO ₂ e	-1067.751677

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.044741
N ₂ O	-0.008729

Pollutant	Emissions Per Year (TONs)
CO ₂	-1064.031566
CO ₂ e	-1067.751677

47.2 Aircraft & Engines

47.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

47.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

47.3 Flight Operations

47.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	816
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3
Climb Out [Intermediate] (mins):	3.6
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

47.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

48. Aircraft

48.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2034, remove 678 T-38C Destination Cycles in Vance 1C MOA with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.063504
N ₂ O	-0.012390

Pollutant	Emissions Per Year (TONs)
CO ₂	-1510.251691
CO ₂ e	-1515.531895

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.063504
N ₂ O	-0.012390

Pollutant	Emissions Per Year (TONs)
CO ₂	-1510.251691
CO ₂ e	-1515.531895

48.2 Aircraft & Engines

48.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

48.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

48.3 Flight Operations

48.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	678
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.04
Climb Out [Intermediate] (mins):	31.92
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

48.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

49. Aircraft

49.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2034, remove 203 T-38C Destination Cycles in Vance 1E MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035411
N ₂ O	-0.006909

Pollutant	Emissions Per Year (TONs)
CO ₂	-842.136324
CO ₂ e	-845.080636

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035411
N ₂ O	-0.006909

Pollutant	Emissions Per Year (TONs)
CO ₂	-842.136324
CO ₂ e	-845.080636

49.2 Aircraft & Engines

49.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

49.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

49.3 Flight Operations

49.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		49
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		203
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

49.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

SUA ROI: Alternative 2 ACAM Report (Low Flight Patterns)

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Department of the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Vance AFB T-7A EIS: Alternative 2, SUA Low Flight Pattern

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2032

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

f. Point of Contact:

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the GCR are:

 applicable
X not applicable

Total reasonably foreseeable net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving “steady state” (hsba.e., no net gain/loss in emission stabilized and the action is fully implemented) emissions. The ACAM analysis uses the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the *USAF Air Emissions Guide for Air Force Stationary Sources*, the *USAF Air Emissions Guide for Air Force Mobile Sources*, and the *USAF Air Emissions Guide for Air Force Transitory Sources*.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of the proposed Action’s potential impacts to local air quality. The insignificance indicators are trivial (de minimis) rate thresholds that have been demonstrated to have little to no impact to air quality. These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold and 25 ton/yr for lead for actions occurring in areas that are "Attainment" (hsba.e., not exceeding any National Ambient Air Quality Standard (NAAQS)). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutants is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQS. For further detail on insignificance indicators, refer to *Level II, Air Quality Quantitative Assessment, Insignificance Indicators*.

The action’s net emissions for every year through achieving steady state were compared against the Insignificance Indicators and are summarized below.

Analysis Summary:

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.075	250	No
NOx	29.375	250	No
CO	4.368	250	No
SOx	1.040	250	No
PM 10	0.240	250	No
PM 2.5	0.212	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2033

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.684	250	No
NOx	168.917	250	No
CO	-37.101	250	No
SOx	3.952	250	No
PM 10	-0.877	250	No
PM 2.5	-0.799	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2034

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	13.523	250	No
NOx	216.279	250	No
CO	-55.365	250	No
SOx	4.804	250	No
PM 10	-1.408	250	No
PM 2.5	-1.278	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2035 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	13.523	250	No
NOx	216.279	250	No
CO	-55.365	250	No
SOx	4.804	250	No
PM 10	-1.408	250	No
PM 2.5	-1.278	250	No
Pb	0.000	25	No
NH3	0.000	250	No

None of the estimated annual net emissions associated with this action are above the insignificance indicators; therefore, the action will not cause or contribute to an exceedance of one or more NAAQSs and will have an insignificant impact on air quality. No further air assessment is needed.

Carolyn Hein, Contractor

Mar 19 2025

Name, Title

Date

SUA ROI: Alternative 2 ACAM Detail Report (Low Flight Patterns)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Vance AFB T-7A EIS: Alternative 2, SUA Low Flight Pattern

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2032

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

- Point of Contact

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-145)
3.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-171)
4.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-175)
5.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-181)
6.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-185)
7.	Aircraft	2032: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
8.	Aircraft	2032: Add T-38C MTR Low-Altitude Operations (IR-145)
9.	Aircraft	2032: Add T-38C MTR Low-Altitude Operations (IR-171)
10.	Aircraft	2032: Add T-38C MTR Low-Altitude Operations (IR-175)
11.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-181)
12.	Aircraft	2032: Add T-38C MTR Low-Altitude Operations (IR-185)
13.	Aircraft	2032: Add T-38C MOA Low-Altitude Operations (Vance 1E MOA)
14.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-145)
15.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-171)
16.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-175)
17.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-181)
18.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-185)
19.	Aircraft	2033: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
20.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-145)
21.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-171)
22.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-175)
23.	Aircraft	2033: Add T-38C MTR Low-Altitude Operations (IR-181)
24.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-185)
25.	Aircraft	2033: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)
26.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-145)
27.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-171)
28.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-175)
29.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-181)
30.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-185)
31.	Aircraft	2034: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
32.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-145)
33.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-171)
34.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-175)
35.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-181)
36.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-185)
37.	Aircraft	2034: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Low-Altitude Operations (IR-145)

- **Activity Description:**

In 2032, add 55 T-7A Low-Altitude Operations in IR-145 with 24 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.305251
SO _x	0.143885
NO _x	4.437569
CO	0.252807

Pollutant	Emissions Per Year (TONs)
PM 10	0.021515
PM 2.5	0.018826
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.018113
N ₂ O	0.003534

Pollutant	Emissions Per Year (TONs)
CO ₂	430.772316
CO ₂ e	432.278400

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.305251
SO _x	0.143885
NO _x	4.437569
CO	0.252807

Pollutant	Emissions Per Year (TONs)
PM 10	0.021515
PM 2.5	0.018826
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.018113
N ₂ O	0.003534

Pollutant	Emissions Per Year (TONs)
CO ₂	430.772316
CO ₂ e	432.278400

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	55
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2032, add 29 T-7A Low-Altitude Operations in IR-171 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.144300

Pollutant	Emissions Per Year (TONs)
PM 10	0.010171

SO _x	0.068018
NO _x	2.097760
CO	0.119509

PM 2.5	0.008900
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008563
N ₂ O	0.001671

Pollutant	Emissions Per Year (TONs)
CO ₂	203.637822
CO ₂ e	204.349789

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.144300
SO _x	0.068018
NO _x	2.097760
CO	0.119509

Pollutant	Emissions Per Year (TONs)
PM 10	0.010171
PM 2.5	0.008900
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008563
N ₂ O	0.001671

Pollutant	Emissions Per Year (TONs)
CO ₂	203.637822
CO ₂ e	204.349789

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 29
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{\text{TRIM}} = AEPS_{\text{IDLE}} + AEPS_{\text{APPROACH}} + AEPS_{\text{INTERMEDIATE}} + AEPS_{\text{MILITARY}} + AEPS_{\text{AFTERBURN}}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2032, add 32 T-7A Low-Altitude Operations in IR-175 with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.189849
SO _x	0.089488
NO _x	2.759918
CO	0.157232

Pollutant	Emissions Per Year (TONs)
PM 10	0.013381
PM 2.5	0.011709
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011265
N ₂ O	0.002198

Pollutant	Emissions Per Year (TONs)
CO ₂	267.916074
CO ₂ e	268.852773

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.189849
SO _x	0.089488
NO _x	2.759918
CO	0.157232

Pollutant	Emissions Per Year (TONs)
PM 10	0.013381
PM 2.5	0.011709
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

CH ₄	0.011265
N ₂ O	0.002198

CO ₂	267.916074
CO _{2e}	268.852773

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 32
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Low-Altitude Operations (IR-181)

- **Activity Description:**

In 2032, add 30 T-7A Low-Altitude Operations in IR-181 with 24 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.149276
SO _x	0.070364
NO _x	2.170097
CO	0.123630

Pollutant	Emissions Per Year (TONs)
PM 10	0.010522
PM 2.5	0.009206
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008858
N ₂ O	0.001728

Pollutant	Emissions Per Year (TONs)
CO ₂	210.659816
CO ₂ e	211.396334

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.149276
SO _x	0.070364
NO _x	2.170097
CO	0.123630

Pollutant	Emissions Per Year (TONs)
PM 10	0.010522
PM 2.5	0.009206
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008858
N ₂ O	0.001728

Pollutant	Emissions Per Year (TONs)
CO ₂	210.659816
CO ₂ e	211.396334

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	30
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2032, add 42 T-7A Low-Altitude Operations in IR-185 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.249177
SO _x	0.117453
NO _x	3.622392
CO	0.206367

Pollutant	Emissions Per Year (TONs)
PM 10	0.017563
PM 2.5	0.015368
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014786
N ₂ O	0.002885

Pollutant	Emissions Per Year (TONs)
CO ₂	351.639847
CO ₂ e	352.869265

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.249177
SO _x	0.117453
NO _x	3.622392
CO	0.206367

Pollutant	Emissions Per Year (TONs)
PM 10	0.017563
PM 2.5	0.015368
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014786
N ₂ O	0.002885

Pollutant	Emissions Per Year (TONs)
CO ₂	351.639847
CO ₂ e	352.869265

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 42
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{\text{TRIM}} = AEPS_{\text{IDLE}} + AEPS_{\text{APPROACH}} + AEPS_{\text{INTERMEDIATE}} + AEPS_{\text{MILITARY}} + AEPS_{\text{AFTERBURN}}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2032, add 145 T-7A Low-Altitude Operations in Vance 1E MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.971253
SO _x	0.457815
NO _x	14.119538
CO	0.804386

Pollutant	Emissions Per Year (TONs)
PM 10	0.068458
PM 2.5	0.059901
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057633
N ₂ O	0.011244

Pollutant	Emissions Per Year (TONs)
CO ₂	1370.639188
CO ₂ e	1375.431274

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.971253
SO _x	0.457815
NO _x	14.119538
CO	0.804386

Pollutant	Emissions Per Year (TONs)
PM 10	0.068458
PM 2.5	0.059901
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057633
N ₂ O	0.011244

Pollutant	Emissions Per Year (TONs)
CO ₂	1370.639188
CO ₂ e	1375.431274

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 145
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2032, add 33 T-38C Low-Altitude Operations in IR-145 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.026557
SO _x	0.037888
NO _x	0.067985
CO	1.097325

Pollutant	Emissions Per Year (TONs)
PM 10	0.040012
PM 2.5	0.035763
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004770
N ₂ O	0.000931

Pollutant	Emissions Per Year (TONs)
CO ₂	113.430607
CO ₂ e	113.827188

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.026557
SO _x	0.037888
NO _x	0.067985
CO	1.097325

Pollutant	Emissions Per Year (TONs)
PM 10	0.040012
PM 2.5	0.035763
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004770
N ₂ O	0.000931

Pollutant	Emissions Per Year (TONs)
CO ₂	113.430607
CO ₂ e	113.827188

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:
Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 33
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2032, add 9 T-38C Low-Altitude Operations in IR-171 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.006494
SO _x	0.009264
NO _x	0.016623
CO	0.268311

Pollutant	Emissions Per Year (TONs)
PM 10	0.009784
PM 2.5	0.008745
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001166
N ₂ O	0.000228

Pollutant	Emissions Per Year (TONs)
CO ₂	27.735384
CO ₂ e	27.832353

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.006494
SO _x	0.009264
NO _x	0.016623
CO	0.268311

Pollutant	Emissions Per Year (TONs)
PM 10	0.009784
PM 2.5	0.008745
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001166
N ₂ O	0.000228

Pollutant	Emissions Per Year (TONs)
CO ₂	27.735384
CO ₂ e	27.832353

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	9
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2032, add 17 T-38C Low-Altitude Operations in IR-175 with 63 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.014624
SO _x	0.020864
NO _x	0.037438
CO	0.604274

Pollutant	Emissions Per Year (TONs)
PM 10	0.022034
PM 2.5	0.019694
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002627
N ₂ O	0.000512

Pollutant	Emissions Per Year (TONs)
CO ₂	62.463877
CO ₂ e	62.682265

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.014624
SO _x	0.020864
NO _x	0.037438
CO	0.604274

Pollutant	Emissions Per Year (TONs)
PM 10	0.022034
PM 2.5	0.019694
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002627
N ₂ O	0.000512

Pollutant	Emissions Per Year (TONs)
CO ₂	62.463877
CO ₂ e	62.682265

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	17
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2032, remove 142 T-38C Low-Altitude Operations in IR-181 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.102453
SO _x	-0.146166
NO _x	-0.262280
CO	-4.233358

Pollutant	Emissions Per Year (TONs)
PM 10	-0.154363
PM 2.5	-0.137970
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018401
N ₂ O	-0.003590

Pollutant	Emissions Per Year (TONs)
CO ₂	-437.602718
CO ₂ e	-439.132683

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.102453
SO _x	-0.146166
NO _x	-0.262280
CO	-4.233358

Pollutant	Emissions Per Year (TONs)
PM 10	-0.154363
PM 2.5	-0.137970
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018401
N ₂ O	-0.003590

Pollutant	Emissions Per Year (TONs)
CO ₂	-437.602718
CO ₂ e	-439.132683

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64

After Burn	7695.00	0.13	0.03	3203.44	3214.64
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11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		142
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2032, add 37 T-38C Low-Altitude Operations in IR-185 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.031829
SO _x	0.045410
NO _x	0.081483
CO	1.315185

Pollutant	Emissions Per Year (TONs)
PM 10	0.047956
PM 2.5	0.042863
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005717
N ₂ O	0.001115

Pollutant	Emissions Per Year (TONs)
CO ₂	135.950790
CO ₂ e	136.426107

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.031829
SO _x	0.045410
NO _x	0.081483
CO	1.315185

Pollutant	Emissions Per Year (TONs)
PM 10	0.047956
PM 2.5	0.042863
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005717
N ₂ O	0.001115

Pollutant	Emissions Per Year (TONs)
CO ₂	135.950790
CO ₂ e	136.426107

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations		
Number of Aircraft:		63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		37
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2032, add 91 T-38C Low-Altitude Operations in Vance 1E MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.088384
SO _x	0.126094
NO _x	0.226262
CO	3.652017

Pollutant	Emissions Per Year (TONs)
PM 10	0.133165
PM 2.5	0.119023
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015874
N ₂ O	0.003097

Pollutant	Emissions Per Year (TONs)
CO ₂	377.509387
CO ₂ e	378.829251

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.088384
SO _x	0.126094
NO _x	0.226262
CO	3.652017

Pollutant	Emissions Per Year (TONs)
PM 10	0.133165
PM 2.5	0.119023
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015874
N ₂ O	0.003097

Pollutant	Emissions Per Year (TONs)
CO ₂	377.509387
CO ₂ e	378.829251

13.2 Aircraft & Engines

13.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

13.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 91
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2033, add 267 T-7A Low-Altitude Operations in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.481855
SO _x	0.698495
NO _x	21.542381
CO	1.227263

Pollutant	Emissions Per Year (TONs)
PM 10	0.104448
PM 2.5	0.091392
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.087932
N ₂ O	0.017156

Pollutant	Emissions Per Year (TONs)
CO ₂	2091.203790
CO ₂ e	2098.515144

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.481855
SO _x	0.698495
NO _x	21.542381
CO	1.227263

Pollutant	Emissions Per Year (TONs)
PM 10	0.104448
PM 2.5	0.091392
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.087932
N ₂ O	0.017156

Pollutant	Emissions Per Year (TONs)
CO ₂	2091.203790
CO ₂ e	2098.515144

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

14.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 267
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2033, add 141 T-7A Low-Altitude Operations in IR-171 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.701599
SO _x	0.330710
NO _x	10.199454
CO	0.581060

Pollutant	Emissions Per Year (TONs)
PM 10	0.049452
PM 2.5	0.043270
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.041632
N ₂ O	0.008122

Pollutant	Emissions Per Year (TONs)
CO ₂	990.101136
CO ₂ e	993.562768

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.701599
SO _x	0.330710
NO _x	10.199454
CO	0.581060

Pollutant	Emissions Per Year (TONs)
PM 10	0.049452
PM 2.5	0.043270
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.041632
N ₂ O	0.008122

Pollutant	Emissions Per Year (TONs)
CO ₂	990.101136
CO ₂ e	993.562768

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

15.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	141
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16. Aircraft

16.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Low-Altitude Operations (IR-175)

- **Activity Description:**

In 2033, add 156 T-7A Low-Altitude Operations in IR-175 with 68 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.925513
SO _x	0.436255
NO _x	13.454598
CO	0.766504

Pollutant	Emissions Per Year (TONs)
PM 10	0.065234
PM 2.5	0.057080
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.054919
N ₂ O	0.010715

Pollutant	Emissions Per Year (TONs)
CO ₂	1306.090860
CO ₂ e	1310.657269

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.925513
SO _x	0.436255
NO _x	13.454598
CO	0.766504

Pollutant	Emissions Per Year (TONs)
PM 10	0.065234
PM 2.5	0.057080
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.054919
N ₂ O	0.010715

Pollutant	Emissions Per Year (TONs)
CO ₂	1306.090860
CO ₂ e	1310.657269

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

16.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 156
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

16.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PS_{IDLE}} + AE_{PS_{APPROACH}} + AE_{PS_{INTERMEDIATE}} + AE_{PS_{MILITARY}} + AE_{PS_{AFTERBURN}}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AE_{PS_{IDLE}}: Aircraft Emissions for Idle Power Setting (TONs)
 AE_{PS_{APPROACH}}: Aircraft Emissions for Approach Power Setting (TONs)
 AE_{PS_{INTERMEDIATE}}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AE_{PS_{MILITARY}}: Aircraft Emissions for Military Power Setting (TONs)
 AE_{PS_{AFTERBURN}}: Aircraft Emissions for After Burner Power Setting (TONs)

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2033, add 148 T-7A Low-Altitude Operations in IR-181 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.731454
SO _x	0.344782
NO _x	10.633473
CO	0.605786

Pollutant	Emissions Per Year (TONs)
PM 10	0.051556
PM 2.5	0.045112
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043404
N ₂ O	0.008468

Pollutant	Emissions Per Year (TONs)
CO ₂	1032.233099
CO ₂ e	1035.842035

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.731454
SO _x	0.344782
NO _x	10.633473

Pollutant	Emissions Per Year (TONs)
PM 10	0.051556
PM 2.5	0.045112
Pb	0.000000

CO	0.605786
----	----------

NH ₃	0.000000
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- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043404
N ₂ O	0.008468

Pollutant	Emissions Per Year (TONs)
CO ₂	1032.233099
CO ₂ e	1035.842035

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 147
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0

Military (mins): 0
AfterBurn (mins): 0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

18. Aircraft

18.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Low-Altitude Operations (IR-185)

- **Activity Description:**

In 2033, add 208 T-7A Low-Altitude Operations in IR-185 with 68 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	1.234018
SO _x	0.581674
NO _x	17.939464
CO	1.022006

Pollutant	Emissions Per Year (TONs)
PM 10	0.086979
PM 2.5	0.076107
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.073226
N ₂ O	0.014286

Pollutant	Emissions Per Year (TONs)
CO ₂	1741.454480
CO ₂ e	1747.543025

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	1.234018
SO _x	0.581674
NO _x	17.939464
CO	1.022006

Pollutant	Emissions Per Year (TONs)
PM 10	0.086979
PM 2.5	0.076107
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.073226
N ₂ O	0.014286

Pollutant	Emissions Per Year (TONs)
CO ₂	1741.454480
CO ₂ e	1747.543025

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
 - Is Aircraft & Engine a Surrogate? No
 - Original Aircraft Name:
 - Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)
 - Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft: 68
 - Flight Operation Cycle Type: LFP (Low Flight Pattern)
 - Number of Annual Flight Operation Cycles for all Aircraft: 208
 - Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi [Idle] (mins): 0
 - Approach [Approach] (mins): 0
 - Climb Out [Intermediate] (mins): 0
 - Takeoff [Military] (mins): 31
 - Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins): 0
 - Approach (mins): 0
 - Intermediate (mins): 0
 - Military (mins): 0
 - AfterBurn (mins): 0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2033, add 707 T-7A Low-Altitude Operations in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	4.735696
SO _x	2.232244
NO _x	68.844920
CO	3.922074

Pollutant	Emissions Per Year (TONs)
PM 10	0.333794
PM 2.5	0.292069
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.281012
N ₂ O	0.054826

Pollutant	Emissions Per Year (TONs)
CO ₂	6683.047628
CO ₂ e	6706.413177

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.735696
SO _x	2.232244
NO _x	68.844920
CO	3.922074

Pollutant	Emissions Per Year (TONs)
PM 10	0.333794
PM 2.5	0.292069
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.281012
N ₂ O	0.054826

Pollutant	Emissions Per Year (TONs)
CO ₂	6683.047628
CO ₂ e	6706.413177

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
 Engine Model: F404-GE-102
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
 Flight Operation Cycle Type: LFP (Low Flight Pattern)
 Number of Annual Flight Operation Cycles for all Aircraft: 707

Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

19.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title**: 2033: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2033, remove 247 T-38C Low-Altitude Operations in IR-145 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.198773
SO _x	-0.283583
NO _x	-0.508860
CO	-8.213311

Pollutant	Emissions Per Year (TONs)
PM 10	-0.299485
PM 2.5	-0.267681
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035700
N ₂ O	-0.006965

Pollutant	Emissions Per Year (TONs)
CO ₂	-849.010907
CO ₂ e	-851.979254

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.198773
SO _x	-0.283583

Pollutant	Emissions Per Year (TONs)
PM 10	-0.299485
PM 2.5	-0.267681

NO _x	-0.508860
CO	-8.213311

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035700
N ₂ O	-0.006965

Pollutant	Emissions Per Year (TONs)
CO ₂	-849.010907
CO ₂ e	-851.979254

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 247
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Remove

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Low-Altitude Operations (IR-171)

- **Activity Description:**

In 2033, remove 130 T-38C Low-Altitude Operations in IR-171 with 14 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.093795
SO _x	-0.133814
NO _x	-0.240115
CO	-3.875609

Pollutant	Emissions Per Year (TONs)
PM 10	-0.141318
PM 2.5	-0.126311
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.016846
N ₂ O	-0.003287

Pollutant	Emissions Per Year (TONs)
CO ₂	-400.622206
CO ₂ e	-402.022878

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.093795
SO _x	-0.133814
NO _x	-0.240115
CO	-3.875609

Pollutant	Emissions Per Year (TONs)
PM 10	-0.141318
PM 2.5	-0.126311
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.016846

Pollutant	Emissions Per Year (TONs)
CO ₂	-400.622206

N ₂ O	-0.003287
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CO ₂ e	-402.022878
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21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gases Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 130
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2033, remove 144 T-38C Low-Altitude Operations in IR-175 with 14 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.123876
SO _x	-0.176730
NO _x	-0.317123
CO	-5.118556

Pollutant	Emissions Per Year (TONs)
PM 10	-0.186640
PM 2.5	-0.166820
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.022248
N ₂ O	-0.004341

Pollutant	Emissions Per Year (TONs)
CO ₂	-529.105778
CO ₂ e	-530.955660

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.123876
SO _x	-0.176730
NO _x	-0.317123
CO	-5.118556

Pollutant	Emissions Per Year (TONs)
PM 10	-0.186640
PM 2.5	-0.166820
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.022248
N ₂ O	-0.004341

Pollutant	Emissions Per Year (TONs)
CO ₂	-529.105778
CO ₂ e	-530.955660

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 144
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2033, add 23 T-38C Low-Altitude Operations in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.016595
SO _x	0.023675
NO _x	0.042482
CO	0.685685

Pollutant	Emissions Per Year (TONs)
PM 10	0.025002
PM 2.5	0.022347
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002980
N ₂ O	0.000581

Pollutant	Emissions Per Year (TONs)
CO ₂	70.879313
CO ₂ e	71.127125

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.016595
SO _x	0.023675
NO _x	0.042482
CO	0.685685

Pollutant	Emissions Per Year (TONs)
PM 10	0.025002
PM 2.5	0.022347
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002980
N ₂ O	0.000581

Pollutant	Emissions Per Year (TONs)
CO ₂	70.879313
CO ₂ e	71.127125

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49

Flight Operation Cycle Type: LFP (Low Flight Pattern)

Number of Annual Flight Operation Cycles for all Aircraft: 23

Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins): 0

Climb Out [Intermediate] (mins): 0

Takeoff [Military] (mins): 26

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0

Intermediate (mins): 0

Military (mins): 0

AfterBurn (mins): 0

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Low-Altitude Operations (IR-185)

- **Activity Description:**

In 2033, remove 192 T-38C Low-Altitude Operations in IR-185 with 14 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.165168
SO _x	-0.235640
NO _x	-0.422830
CO	-6.824742

Pollutant	Emissions Per Year (TONs)
PM 10	-0.248853
PM 2.5	-0.222426
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.029664
N ₂ O	-0.005787

Pollutant	Emissions Per Year (TONs)
CO ₂	-705.474371
CO ₂ e	-707.940879

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.165168
SO _x	-0.235640
NO _x	-0.422830
CO	-6.824742

Pollutant	Emissions Per Year (TONs)
PM 10	-0.248853
PM 2.5	-0.222426
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.029664
N ₂ O	-0.005787

Pollutant	Emissions Per Year (TONs)
CO ₂	-705.474371
CO ₂ e	-707.940879

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	192
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- **Activity Description:**

In 2033, remove 654 T-38C Low-Altitude Operations in Vance 1E MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.635198
SO _x	-0.906215
NO _x	-1.626106
CO	-26.246361

Pollutant	Emissions Per Year (TONs)
PM 10	-0.957031
PM 2.5	-0.855399
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.114081
N ₂ O	-0.022257

Pollutant	Emissions Per Year (TONs)
CO ₂	-2713.089439
CO ₂ e	-2722.575055

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.635198
SO _x	-0.906215
NO _x	-1.626106
CO	-26.246361

Pollutant	Emissions Per Year (TONs)
PM 10	-0.957031
PM 2.5	-0.855399
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.114081
N ₂ O	-0.022257

Pollutant	Emissions Per Year (TONs)
CO ₂	-2713.089439
CO ₂ e	-2722.575055

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23

Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	654
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2034, add 91 T-7A Low-Altitude Operations in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.505052
SO _x	0.238064
NO _x	7.342160
CO	0.418281

Pollutant	Emissions Per Year (TONs)
PM 10	0.035598
PM 2.5	0.031149
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.029969
N ₂ O	0.005847

Pollutant	Emissions Per Year (TONs)
CO ₂	712.732378
CO ₂ e	715.224262

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.505052
SO _x	0.238064
NO _x	7.342160
CO	0.418281

Pollutant	Emissions Per Year (TONs)
PM 10	0.035598
PM 2.5	0.031149
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.029969
N ₂ O	0.005847

Pollutant	Emissions Per Year (TONs)
CO ₂	712.732378
CO ₂ e	715.224262

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:

Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		91
Number of Annual Trim Test(s) per Aircraft:		0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2034, add 48 T-7A Low-Altitude Operations in IR-171 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.238842
SO _x	0.112582
NO _x	3.472154
CO	0.197808

Pollutant	Emissions Per Year (TONs)
PM 10	0.016835
PM 2.5	0.014730
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014173
N ₂ O	0.002765

Pollutant	Emissions Per Year (TONs)
CO ₂	337.055706
CO ₂ e	338.234134

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	0.238842
SO _x	0.112582
NO _x	3.472154
CO	0.197808

PM 10	0.016835
PM 2.5	0.014730
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014173
N ₂ O	0.002765

Pollutant	Emissions Per Year (TONs)
CO ₂	337.055706
CO ₂ e	338.234134

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 48
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2034, add 53 T-7A Low-Altitude Operations in IR-175 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.314437
SO _x	0.148215
NO _x	4.571114
CO	0.260415

Pollutant	Emissions Per Year (TONs)
PM 10	0.022163
PM 2.5	0.019393
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.018658
N ₂ O	0.003640

Pollutant	Emissions Per Year (TONs)
CO ₂	443.735997
CO ₂ e	445.287406

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.314437
SO _x	0.148215
NO _x	4.571114
CO	0.260415

Pollutant	Emissions Per Year (TONs)
PM 10	0.022163
PM 2.5	0.019393
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.018658
N ₂ O	0.003640

Pollutant	Emissions Per Year (TONs)
CO ₂	443.735997
CO ₂ e	445.287406

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

28.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 68
- Flight Operation Cycle Type:** LFP (Low Flight Pattern)
- Number of Annual Flight Operation Cycles for all Aircraft:** 53
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 31
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

28.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC} : Aircraft Emissions (TONs)
- AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
- $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
- $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
- $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- $AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM} : Aircraft Emissions (TONs)
- $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
- $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
- $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
- $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
- $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

29. Aircraft

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

- County(s):** Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
- Regulatory Area(s):** NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2034, add 51 T-7A Low-Altitude Operations in IR-181 with 68 aircraft.

- Activity Start Date

- Start Month:** 1
- Start Year:** 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.253770
SO _x	0.119618
NO _x	3.689164
CO	0.210171

Pollutant	Emissions Per Year (TONs)
PM 10	0.017887
PM 2.5	0.015651
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015058
N ₂ O	0.002938

Pollutant	Emissions Per Year (TONs)
CO ₂	358.121687
CO ₂ e	359.373767

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.253770
SO _x	0.119618
NO _x	3.689164
CO	0.210171

Pollutant	Emissions Per Year (TONs)
PM 10	0.017887
PM 2.5	0.015651
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015058
N ₂ O	0.002938

Pollutant	Emissions Per Year (TONs)
CO ₂	358.121687
CO ₂ e	359.373767

29.2 Aircraft & Engines

29.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

29.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

29.3 Flight Operations

29.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	51
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

29.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

30. Aircraft

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2034, add 71 T-7A Low-Altitude Operations in IR-185 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.421227
SO _x	0.198552
NO _x	6.123567
CO	0.348858

Pollutant	Emissions Per Year (TONs)
PM 10	0.029690
PM 2.5	0.025979
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.024995
N ₂ O	0.004877

Pollutant	Emissions Per Year (TONs)
CO ₂	594.438789
CO ₂ e	596.517090

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.421227
SO _x	0.198552
NO _x	6.123567
CO	0.348858

Pollutant	Emissions Per Year (TONs)
PM 10	0.029690
PM 2.5	0.025979
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.024995
N ₂ O	0.004877

Pollutant	Emissions Per Year (TONs)
CO ₂	594.438789
CO ₂ e	596.517090

30.2 Aircraft & Engines

30.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

30.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

30.3 Flight Operations

30.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 71
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

30.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

31. Aircraft

31.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2034, add 241 T-7A Low-Altitude Operations in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.614290
SO _x	0.760921
NO _x	23.467646
CO	1.336945

Pollutant	Emissions Per Year (TONs)
PM 10	0.113783
PM 2.5	0.099560
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.095791
N ₂ O	0.018689

Pollutant	Emissions Per Year (TONs)
CO ₂	2278.096858
CO ₂ e	2286.061635

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.614290
SO _x	0.760921
NO _x	23.467646
CO	1.336945

Pollutant	Emissions Per Year (TONs)
PM 10	0.113783
PM 2.5	0.099560
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.095791
N ₂ O	0.018689

Pollutant	Emissions Per Year (TONs)
CO ₂	2278.096858
CO ₂ e	2286.061635

31.2 Aircraft & Engines

31.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

31.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

31.3 Flight Operations

31.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 68
- Flight Operation Cycle Type:** LFP (Low Flight Pattern)
- Number of Annual Flight Operation Cycles for all Aircraft:** 241
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 35
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

31.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

32. Aircraft

32.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

- County(s):** Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
- Regulatory Area(s):** NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2034, remove 96 T-38C Low-Altitude Operations in IR-145 with 49 aircraft.

- Activity Start Date

- Start Month:** 1
- Start Year:** 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.077256
SO _x	-0.110219
NO _x	-0.197775
CO	-3.192218

Pollutant	Emissions Per Year (TONs)
PM 10	-0.116399
PM 2.5	-0.104038
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013875
N ₂ O	-0.002707

Pollutant	Emissions Per Year (TONs)
CO ₂	-329.979948
CO ₂ e	-331.133637

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.077256
SO _x	-0.110219
NO _x	-0.197775
CO	-3.192218

Pollutant	Emissions Per Year (TONs)
PM 10	-0.116399
PM 2.5	-0.104038
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013875
N ₂ O	-0.002707

Pollutant	Emissions Per Year (TONs)
CO ₂	-329.979948
CO ₂ e	-331.133637

32.2 Aircraft & Engines

32.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

32.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

32.3 Flight Operations

32.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	96
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

32.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

33. Aircraft

33.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2034, remove 50 T-38C Low-Altitude Operations in IR-171 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.036075
SO _x	-0.051467
NO _x	-0.092352
CO	-1.490619

Pollutant	Emissions Per Year (TONs)
PM 10	-0.054353
PM 2.5	-0.048581
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006479
N ₂ O	-0.001264

Pollutant	Emissions Per Year (TONs)
CO ₂	-154.085464
CO ₂ e	-154.624184

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.036075
SO _x	-0.051467
NO _x	-0.092352
CO	-1.490619

Pollutant	Emissions Per Year (TONs)
PM 10	-0.054353
PM 2.5	-0.048581
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006479
N ₂ O	-0.001264

Pollutant	Emissions Per Year (TONs)
CO ₂	-154.085464
CO ₂ e	-154.624184

33.2 Aircraft & Engines

33.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

33.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

33.3 Flight Operations

33.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		50
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		26
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

33.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

34. Aircraft

34.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2034, remove 56 T-38C Low-Altitude Operations in IR-175 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.048174
SO _x	-0.068728
NO _x	-0.123325
CO	-1.990550

Pollutant	Emissions Per Year (TONs)
PM 10	-0.072582
PM 2.5	-0.064874
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008652
N ₂ O	-0.001688

Pollutant	Emissions Per Year (TONs)
CO ₂	-205.763358
CO ₂ e	-206.482756

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.048174
SO _x	-0.068728
NO _x	-0.123325
CO	-1.990550

Pollutant	Emissions Per Year (TONs)
PM 10	-0.072582
PM 2.5	-0.064874
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008652
N ₂ O	-0.001688

Pollutant	Emissions Per Year (TONs)
CO ₂	-205.763358
CO ₂ e	-206.482756

34.2 Aircraft & Engines

34.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

34.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

34.3 Flight Operations

34.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	56
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

34.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

35. Aircraft

35.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2034, remove 53 T-38C Low-Altitude Operations in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.038240
SO _x	-0.054555
NO _x	-0.097893
CO	-1.580056

Pollutant	Emissions Per Year (TONs)
PM 10	-0.057614
PM 2.5	-0.051496
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006868
N ₂ O	-0.001340

Pollutant	Emissions Per Year (TONs)
CO ₂	-163.330592
CO ₂ e	-163.901635

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.038240
SO _x	-0.054555
NO _x	-0.097893
CO	-1.580056

Pollutant	Emissions Per Year (TONs)
PM 10	-0.057614
PM 2.5	-0.051496
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006868
N ₂ O	-0.001340

Pollutant	Emissions Per Year (TONs)
CO ₂	-163.330592
CO ₂ e	-163.901635

35.2 Aircraft & Engines

35.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

35.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

35.3 Flight Operations

35.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 53
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

35.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

36. Aircraft

36.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2034, remove 74 T-38C Low-Altitude Operations in IR-185 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.063659
SO _x	-0.090819
NO _x	-0.162966
CO	-2.630369

Pollutant	Emissions Per Year (TONs)
PM 10	-0.095912
PM 2.5	-0.085727
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011433
N ₂ O	-0.002231

Pollutant	Emissions Per Year (TONs)
CO ₂	-271.901580
CO ₂ e	-272.852214

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.063659
SO _x	-0.090819
NO _x	-0.162966
CO	-2.630369

Pollutant	Emissions Per Year (TONs)
PM 10	-0.095912
PM 2.5	-0.085727
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011433
N ₂ O	-0.002231

Pollutant	Emissions Per Year (TONs)
CO ₂	-271.901580
CO ₂ e	-272.852214

36.2 Aircraft & Engines

36.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

36.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

36.3 Flight Operations

36.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 74
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

36.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

37. Aircraft

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2034, remove 253 T-38C Low-Altitude Operations in Vance 1E MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.245726
SO _x	-0.350569
NO _x	-0.629059
CO	-10.153409

Pollutant	Emissions Per Year (TONs)
PM 10	-0.370228
PM 2.5	-0.330911
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.044132
N ₂ O	-0.008610

Pollutant	Emissions Per Year (TONs)
CO ₂	-1049.559064
CO ₂ e	-1053.228576

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.245726
SO _x	-0.350569
NO _x	-0.629059
CO	-10.153409

Pollutant	Emissions Per Year (TONs)
PM 10	-0.370228
PM 2.5	-0.330911
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.044132
N ₂ O	-0.008610

Pollutant	Emissions Per Year (TONs)
CO ₂	-1049.559064
CO ₂ e	-1053.228576

37.2 Aircraft & Engines

37.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

37.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

37.3 Flight Operations

37.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 253
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

37.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

SUA ROI: Alternative 2 GHG Report (Destination Cycles)

AIR CONFORMITY APPLICABILITY MODEL REPORT GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to estimate GHG emissions associated with the action. The analysis was performed in accordance with the Department of the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention* and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the GHG emissions analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Vance AFB T-7A EIS: Alternative 2, SUA Destination Cycle

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2032

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

f. Point of Contact:

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action's start through the action's "steady state" (SS, net gain/loss in emission stabilized and the action is fully implemented) of emissions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO₂ equivalents (CO₂e). The CO₂e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO₂. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO₂e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO₂e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO₂e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected steady state of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	CO₂	CH₄	N₂O	CO₂e	Threshold	Exceedance
2032	9,727	0.40899958	0.07979591	9,761	68,039	No
2033	26,848	1.12892524	0.22025357	26,942	68,039	No
2034	34,575	1.45383354	0.28364325	34,696	68,039	No
2035 [SS Year]	34,575	1.45383354	0.28364325	34,696	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. <https://statesummaries.ncics.org/downloads/>).

State's Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2032	94,683,042	1,117,798	43,525	137,515,492
2033	94,683,042	1,117,798	43,525	137,515,492
2034	94,683,042	1,117,798	43,525	137,515,492
2035 [SS Year]	94,683,042	1,117,798	43,525	137,515,492

U.S. Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2032	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2033	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2034	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2035 [SS Year]	5,136,454,179	25,626,912	1,500,708	6,251,695,230

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (Rtba.e., global, national, and regional) and the degree (intensity) of the proposed action’s effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative’s annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action’s surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area’s ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action’s GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action’s net change in GHG emissions is compared relative to the state (where the action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action’s net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2032-2035	State Total	378,732,166	4,471,190	174,100	550,061,969
2032-2035	U.S. Total	20,545,816,716	102,507,647	6,002,831	25,006,780,918
2032-2035	Action	105,725	4.445592	0.867336	106,095
Percent of State Totals		0.02791556%	0.00009943%	0.00049818%	0.01928780%
Percent of U.S. Totals		0.00051458%	0.00000434%	0.00001445%	0.00042426%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00005685%.*

* Global value based on the U.S. emitting 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, <https://www.c2es.org/content/international-emissions>).

SUA ROI: Alternative 2 ACAM Detail Report (Destination Cycles)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Action Title:** Vance AFB T-7A EIS: Alternative 2, SUA Destination Cycle

- **Project Number/s (if applicable):**

- **Projected Action Start Date:** 1 / 2032

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

- Point of Contact

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-145)
3.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-171)
4.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-175)
5.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-181)
6.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-185)
7.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1A MOA)
8.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1C MOA)
9.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1E MOA)
10.	Aircraft	2032: Add T-38C MTR Destination Cycles (IR-145)
11.	Aircraft	2032: Add T-38C MTR Destination Cycles (IR-171)
12.	Aircraft	2032: Add T-38C MTR Destination Cycles (IR-175)
13.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-181)
14.	Aircraft	2032: Add T-38C MTR Destination Cycles (IR-185)
15.	Aircraft	2032: Add T-38C MOA Destination Cycles (Vance 1A MOA)
16.	Aircraft	2032: Add T-38C MOA Destination Cycles (Vance 1C MOA)
17.	Aircraft	2032: Add T-38C MOA Destination Cycles (Vance 1E MOA)
18.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-145)
19.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-171)
20.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-175)
21.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-181)
22.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-185)
23.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1A MOA)
24.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1C MOA)
25.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1E MOA)
26.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-145)
27.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-171)
28.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-175)
29.	Aircraft	2033: Add T-38C MTR Destination Cycles (IR-181)
30.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-185)
31.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1A MOA)
32.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
33.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1E MOA)
34.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-145)
35.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-171)
36.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-175)
37.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-181)
38.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-185)
39.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1A MOA)
40.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1C MOA)
41.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1E MOA)
42.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-145)
43.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-171)
44.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-175)
45.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-181)
46.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-185)
47.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1A MOA)
48.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
49.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2032, add 57 T-7A Destination Cycles in IR-145 with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.018772
N ₂ O	0.003662

Pollutant	Emissions Per Year (TONs)
CO ₂	446.436764
CO ₂ e	447.997615

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.018772
N ₂ O	0.003662

Pollutant	Emissions Per Year (TONs)
CO ₂	446.436764
CO ₂ e	447.997615

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

2.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 24
- Flight Operation Cycle Type:** DC (Destination Cycle)
- Number of Annual Flight Operation Cycles for all Aircraft:** 57
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 29
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

2.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Destination Cycles (IR-171)

- Activity Description:

In 2032, add 30 T-7A Destination Cycles in IR-171 with 24 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008858
N ₂ O	0.001728

Pollutant	Emissions Per Year (TONs)
CO ₂	210.659816
CO ₂ e	211.396334

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.008858
N ₂ O	0.001728

Pollutant	Emissions Per Year (TONs)
CO ₂	210.659816
CO ₂ e	211.396334

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	30
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2032, add 33 T-7A Destination Cycles in IR-175 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011618

Pollutant	Emissions Per Year (TONs)
CO ₂	276.288451

N ₂ O	0.002267
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CO ₂ e	277.254422
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- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011618
N ₂ O	0.002267

Pollutant	Emissions Per Year (TONs)
CO ₂	276.288451
CO ₂ e	277.254422

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 33
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK;
 Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2032, add 32 T-7A Destination Cycles in IR-181 with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009448
N ₂ O	0.001843

Pollutant	Emissions Per Year (TONs)
CO ₂	224.703804
CO ₂ e	225.489423

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009448
N ₂ O	0.001843

Pollutant	Emissions Per Year (TONs)
CO ₂	224.703804
CO ₂ e	225.489423

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	32
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6. Aircraft

6.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Destination Cycles (IR-185)

- **Activity Description:**

In 2032, add 44 T-7A Destination Cycles in IR-185 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015490
N ₂ O	0.003022

Pollutant	Emissions Per Year (TONs)
CO ₂	368.384602
CO ₂ e	369.672563

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015490
N ₂ O	0.003022

Pollutant	Emissions Per Year (TONs)
CO ₂	368.384602
CO ₂ e	369.672563

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		44
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2032, add 540 T-7A Destination Cycles in Vance 1A MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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CH ₄	0.069524
N ₂ O	0.013564

CO ₂	1653.432491
CO ₂ e	1659.213291

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.069524
N ₂ O	0.013564

Pollutant	Emissions Per Year (TONs)
CO ₂	1653.432491
CO ₂ e	1659.213291

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 540
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.6
Climb Out [Intermediate] (mins): 3
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2032, add 1,090 T-7A Destination Cycles in Vance 1C MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.158392
N ₂ O	0.030902

Pollutant	Emissions Per Year (TONs)
CO ₂	3766.880846
CO ₂ e	3780.050771

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.158392
N ₂ O	0.030902

Pollutant	Emissions Per Year (TONs)
CO ₂	3766.880846
CO ₂ e	3780.050771

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 1090
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 31.92
Climb Out [Intermediate] (mins): 3.04
Takeoff [Military] (mins): 3.04
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2032, add 145 T-7A Destination Cycles in Vance 1E MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057633
N ₂ O	0.011244

Pollutant	Emissions Per Year (TONs)
CO ₂	1370.639188
CO ₂ e	1375.431274

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057633
N ₂ O	0.011244

Pollutant	Emissions Per Year (TONs)
CO ₂	1370.639188
CO ₂ e	1375.431274

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		145
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		35
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2032, add 35 T-38C Destination Cycles in IR-145 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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CH ₄	0.005059
N ₂ O	0.000987

CO ₂	120.305189
CO ₂ e	120.725805

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005059
N ₂ O	0.000987

Pollutant	Emissions Per Year (TONs)
CO ₂	120.305189
CO ₂ e	120.725805

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)

Number of Annual Flight Operation Cycles for all Aircraft: 35
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

10.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2032, add 9 T-38C Destination Cycles in IR-171 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001166
N ₂ O	0.000228

Pollutant	Emissions Per Year (TONs)
CO ₂	27.735384
CO ₂ e	27.832353

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000

SO _x	0.000000
NO _x	0.000000
CO	0.000000

PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001166
N ₂ O	0.000228

Pollutant	Emissions Per Year (TONs)
CO ₂	27.735384
CO ₂ e	27.832353

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 9
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{\text{TRIM}} = AEPS_{\text{IDLE}} + AEPS_{\text{APPROACH}} + AEPS_{\text{INTERMEDIATE}} + AEPS_{\text{MILITARY}} + AEPS_{\text{AFTERBURN}}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2032, add 17 T-38C Destination Cycles in IR-175 with 63 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002627
N ₂ O	0.000512

Pollutant	Emissions Per Year (TONs)
CO ₂	62.463877
CO ₂ e	62.682265

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

CH ₄	0.002627
N ₂ O	0.000512

CO ₂	62.463877
CO ₂ e	62.682265

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 17
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2032, remove 141 T-38C Destination Cycles in IR-181 with 63 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018271
N ₂ O	-0.003565

Pollutant	Emissions Per Year (TONs)
CO ₂	-434.521008
CO ₂ e	-436.040199

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018271
N ₂ O	-0.003565

Pollutant	Emissions Per Year (TONs)
CO ₂	-434.521008
CO ₂ e	-436.040199

13.2 Aircraft & Engines

13.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

13.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 141
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2032, add 39 T-38C Destination Cycles in IR-185 with 63 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.006026
N ₂ O	0.001176

Pollutant	Emissions Per Year (TONs)
CO ₂	143.299482
CO ₂ e	143.800491

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.006026
N ₂ O	0.001176

Pollutant	Emissions Per Year (TONs)
CO ₂	143.299482
CO ₂ e	143.800491

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

14.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63

Flight Operation Cycle Type: DC (Destination Cycle)

Number of Annual Flight Operation Cycles for all Aircraft: 39

Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins): 0

Climb Out [Intermediate] (mins): 0

Takeoff [Military] (mins): 31

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0

Intermediate (mins): 0

Military (mins): 0

AfterBurn (mins): 0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-38C MOA Destination Cycles (Vance 1A MOA)

- **Activity Description:**

In 2032, add 366 T-38C Destination Cycles in Vance 1A MOA with 63 aircraft.

- **Activity Start Date**

Start Month: 1

Start Year: 2032

- **Activity End Date**

Indefinite: Yes

End Month: N/A

End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.020068
N ₂ O	0.003915

Pollutant	Emissions Per Year (TONs)
CO ₂	477.249452
CO ₂ e	478.918032

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.020068
N ₂ O	0.003915

Pollutant	Emissions Per Year (TONs)
CO ₂	477.249452
CO ₂ e	478.918032

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

15.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	366
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3
Climb Out [Intermediate] (mins):	3.6
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

16. Aircraft

16.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-38C MOA Destination Cycles (Vance 1C MOA)

- **Activity Description:**

In 2032, add 732 T-38C Destination Cycles in Vance 1C MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.068562
N ₂ O	0.013376

Pollutant	Emissions Per Year (TONs)
CO ₂	1630.537224
CO ₂ e	1636.237976

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.068562
N ₂ O	0.013376

Pollutant	Emissions Per Year (TONs)
CO ₂	1630.537224
CO ₂ e	1636.237976

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

16.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17

Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	732
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.04
Climb Out [Intermediate] (mins):	31.92
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2032, add 91 T-38C Destination Cycles in Vance 1E MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015874
N ₂ O	0.003097

Pollutant	Emissions Per Year (TONs)
CO ₂	377.509387
CO ₂ e	378.829251

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015874
N ₂ O	0.003097

Pollutant	Emissions Per Year (TONs)
CO ₂	377.509387
CO ₂ e	378.829251

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64

Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	91
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2033, add 280 T-7A Destination Cycles in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000

NO _x	0.000000
CO	0.000000

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.092213
N ₂ O	0.017991

Pollutant	Emissions Per Year (TONs)
CO ₂	2193.022701
CO ₂ e	2200.690038

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.092213
N ₂ O	0.017991

Pollutant	Emissions Per Year (TONs)
CO ₂	2193.022701
CO ₂ e	2200.690038

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 280
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-171)

- **Activity Description:**

In 2033, add 148 T-7A Destination Cycles in IR-171 with 68 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043699
N ₂ O	0.008526

Pollutant	Emissions Per Year (TONs)
CO ₂	1039.255093
CO ₂ e	1042.888580

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043699

Pollutant	Emissions Per Year (TONs)
CO ₂	1039.255093

N ₂ O	0.008526
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CO ₂ e	1042.888580
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19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 148
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-175)

- **Activity Description:**

In 2033, add 163 T-7A Destination Cycles in IR-175 with 68 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057384
N ₂ O	0.011196

Pollutant	Emissions Per Year (TONs)
CO ₂	1364.697501
CO ₂ e	1369.468813

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.057384
N ₂ O	0.011196

Pollutant	Emissions Per Year (TONs)
CO ₂	1364.697501
CO ₂ e	1369.468813

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		68
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		163
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2033, add 155 T-7A Destination Cycles in IR-181 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.045766
N ₂ O	0.008929

Pollutant	Emissions Per Year (TONs)
CO ₂	1088.409050
CO ₂ e	1092.214391

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.045766
N ₂ O	0.008929

Pollutant	Emissions Per Year (TONs)
CO ₂	1088.409050
CO ₂ e	1092.214391

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 155
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2033, add 217 T-7A Destination Cycles in IR-185 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.076394
N ₂ O	0.014904

Pollutant	Emissions Per Year (TONs)
CO ₂	1816.805876
CO ₂ e	1823.157868

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.076394
N ₂ O	0.014904

Pollutant	Emissions Per Year (TONs)
CO ₂	1816.805876
CO ₂ e	1823.157868

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 217
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2033, add 2,640 T-7A Destination Cycles in Vance 1A MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.339897
N ₂ O	0.066314

Pollutant	Emissions Per Year (TONs)
CO ₂	8083.447735
CO ₂ e	8111.709421

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.339897
N ₂ O	0.066314

Pollutant	Emissions Per Year (TONs)
CO ₂	8083.447735
CO ₂ e	8111.709421

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		68
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		2640
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.6
Climb Out [Intermediate] (mins):	3
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2033, add 5,327 T-7A Destination Cycles in Vance 1C MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.774086
N ₂ O	0.151024

Pollutant	Emissions Per Year (TONs)
CO ₂	18409.334189
CO ₂ e	18473.697668

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.774086
N ₂ O	0.151024

Pollutant	Emissions Per Year (TONs)
CO ₂	18409.334189
CO ₂ e	18473.697668

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 5327
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	31.92
Climb Out [Intermediate] (mins):	3.04
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2033, add 707 T-7A Destination Cycles in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.281012
N ₂ O	0.054826

Pollutant	Emissions Per Year (TONs)
CO ₂	6683.047628
CO ₂ e	6706.413177

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.281012
N ₂ O	0.054826

Pollutant	Emissions Per Year (TONs)
CO ₂	6683.047628
CO ₂ e	6706.413177

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 707
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2033, remove 259 T-38C Destination Cycles in IR-145 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.037434
N ₂ O	-0.007303

Pollutant	Emissions Per Year (TONs)
CO ₂	-890.258400
CO ₂ e	-893.370958

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.037434
N ₂ O	-0.007303

Pollutant	Emissions Per Year (TONs)
CO ₂	-890.258400
CO ₂ e	-893.370958

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 259
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2033, remove 137 T-38C Destination Cycles in IR-171 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.017753
N ₂ O	-0.003464

Pollutant	Emissions Per Year (TONs)
CO ₂	-422.194171
CO ₂ e	-423.670264

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.017753
N ₂ O	-0.003464

Pollutant	Emissions Per Year (TONs)
CO ₂	-422.194171
CO ₂ e	-423.670264

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	137
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2033, remove 151 T-38C Destination Cycles in IR-175 with 14 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.023330
N ₂ O	-0.004552

Pollutant	Emissions Per Year (TONs)
CO ₂	-554.826198
CO ₂ e	-556.766004

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.023330
N ₂ O	-0.004552

Pollutant	Emissions Per Year (TONs)
CO ₂	-554.826198
CO ₂ e	-556.766004

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

28.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	151
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

28.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

29. Aircraft

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2033, add 16 T-38C Destination Cycles in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002073
N ₂ O	0.000405

Pollutant	Emissions Per Year (TONs)
CO ₂	49.307348
CO ₂ e	49.479739

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002073
N ₂ O	0.000405

Pollutant	Emissions Per Year (TONs)
CO ₂	49.307348
CO ₂ e	49.479739

29.2 Aircraft & Engines

29.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

29.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64

After Burn	7695.00	0.13	0.03	3203.44	3214.64
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29.3 Flight Operations

29.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	16
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

29.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

30. Aircraft

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2033, remove 201 T-38C Destination Cycles in IR-185 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.031055
N ₂ O	-0.006059

Pollutant	Emissions Per Year (TONs)
CO ₂	-738.543482
CO ₂ e	-741.125608

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.031055
N ₂ O	-0.006059

Pollutant	Emissions Per Year (TONs)
CO ₂	-738.543482
CO ₂ e	-741.125608

30.2 Aircraft & Engines

30.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

30.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

30.3 Flight Operations

30.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		14
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		201
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		31
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

30.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

31. Aircraft

31.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2033, remove 2,445 T-38C Destination Cycles in Vance 1A MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.134058
N ₂ O	-0.026155

Pollutant	Emissions Per Year (TONs)
CO ₂	-3188.182816
CO ₂ e	-3199.329473

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.134058
N ₂ O	-0.026155

Pollutant	Emissions Per Year (TONs)
CO ₂	-3188.182816
CO ₂ e	-3199.329473

31.2 Aircraft & Engines

31.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

31.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

31.3 Flight Operations

31.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 2445
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3
Climb Out [Intermediate] (mins):	3.6
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

31.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

32. Aircraft

32.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2033, remove 5,992 T-38C Destination Cycles in Vance 1C MOA with 14 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.561232
N ₂ O	-0.109496

Pollutant	Emissions Per Year (TONs)
CO ₂	-13347.239131
CO ₂ e	-13393.904303

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	-0.561232	CO ₂	-13347.239131
N ₂ O	-0.109496	CO ₂ e	-13393.904303

32.2 Aircraft & Engines

32.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

32.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

32.3 Flight Operations

32.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 5992
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.04
Climb Out [Intermediate] (mins): 31.92
Takeoff [Military] (mins): 3.04

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

32.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

33. Aircraft

33.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2033, remove 654 T-38C Destination Cycles in Vance 1E MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.114081
N ₂ O	-0.022257

Pollutant	Emissions Per Year (TONs)
CO ₂	-2713.089439
CO ₂ e	-2722.575055

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.114081
N ₂ O	-0.022257

Pollutant	Emissions Per Year (TONs)
CO ₂	-2713.089439
CO ₂ e	-2722.575055

33.2 Aircraft & Engines

33.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

33.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

33.3 Flight Operations

33.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 654
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

33.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

34. Aircraft

34.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2034, add 95 T-7A Destination Cycles in IR-145 with 68 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.031287
N ₂ O	0.006104

Pollutant	Emissions Per Year (TONs)
CO ₂	744.061274
CO ₂ e	746.662692

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.031287
N ₂ O	0.006104

Pollutant	Emissions Per Year (TONs)
CO ₂	744.061274
CO ₂ e	746.662692

34.2 Aircraft & Engines

34.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
 Engine Model: F404-GE-102
 Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

34.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
- Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

34.3 Flight Operations

34.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 68
- Flight Operation Cycle Type:** DC (Destination Cycle)
- Number of Annual Flight Operation Cycles for all Aircraft:** 95
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 29
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

34.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
- $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

35. Aircraft

35.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Destination Cycles (IR-171)

- **Activity Description:**

In 2034, add 50 T-7A Destination Cycles in IR-171 with 68 aircraft.

- **Activity Start Date**

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014763
N ₂ O	0.002880

Pollutant	Emissions Per Year (TONs)
CO ₂	351.099694
CO ₂ e	352.327223

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014763
N ₂ O	0.002880

Pollutant	Emissions Per Year (TONs)
CO ₂	351.099694
CO ₂ e	352.327223

35.2 Aircraft & Engines

35.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

35.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

35.3 Flight Operations

35.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	50
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

35.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

36. Aircraft

36.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2034, add 56 T-7A Destination Cycles in IR-175 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.019715
N ₂ O	0.003846

Pollutant	Emissions Per Year (TONs)
CO ₂	468.853129
CO ₂ e	470.492353

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.019715
N ₂ O	0.003846

Pollutant	Emissions Per Year (TONs)
CO ₂	468.853129
CO ₂ e	470.492353

36.2 Aircraft & Engines

36.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

36.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

36.3 Flight Operations

36.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 56
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

36.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

37. Aircraft

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2034, add 53 T-7A Destination Cycles in IR-181 with 68 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015649
N ₂ O	0.003053

Pollutant	Emissions Per Year (TONs)
CO ₂	372.165675
CO ₂ e	373.466856

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015649
N ₂ O	0.003053

Pollutant	Emissions Per Year (TONs)
CO ₂	372.165675
CO ₂ e	373.466856

37.2 Aircraft & Engines

37.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
 Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

37.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

37.3 Flight Operations

37.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 53
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

37.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

38. Aircraft

38.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2034, add 74 T-7A Destination Cycles in IR-185 with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.026051
N ₂ O	0.005083

Pollutant	Emissions Per Year (TONs)
CO ₂	619.555921
CO ₂ e	621.722038

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.026051
N ₂ O	0.005083

Pollutant	Emissions Per Year (TONs)
CO ₂	619.555921
CO ₂ e	621.722038

38.2 Aircraft & Engines

38.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

38.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

38.3 Flight Operations

38.3.1 Flight Operations Assumptions

- Flight Operations		
Number of Aircraft:		68
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		74
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)		
Taxi [Idle] (mins):	0	
Approach [Approach] (mins):	0	
Climb Out [Intermediate] (mins):	0	
Takeoff [Military] (mins):	31	
Takeoff [After Burn] (mins):	0	

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test		
Idle (mins):	0	
Approach (mins):	0	
Intermediate (mins):	0	
Military (mins):	0	
AfterBurn (mins):	0	

38.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

39. Aircraft

39.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2034, add 900 T-7A Destination Cycles in Vance 1A MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.115874
N ₂ O	0.022607

Pollutant	Emissions Per Year (TONs)
CO ₂	2755.720819
CO ₂ e	2765.355484

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.115874
N ₂ O	0.022607

Pollutant	Emissions Per Year (TONs)
CO ₂	2755.720819
CO ₂ e	2765.355484

39.2 Aircraft & Engines

39.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

39.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

39.3 Flight Operations

39.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 68
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 900
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.6
Climb Out [Intermediate] (mins): 3
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

39.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

40. Aircraft

40.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2034, add 1,816 T-7A Destination Cycles in Vance 1C MOA with 68 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.263890
N ₂ O	0.051485

Pollutant	Emissions Per Year (TONs)
CO ₂	6275.830840
CO ₂ e	6297.772661

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.263890
N ₂ O	0.051485

Pollutant	Emissions Per Year (TONs)
CO ₂	6275.830840
CO ₂ e	6297.772661

40.2 Aircraft & Engines

40.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
 - Is Aircraft & Engine a Surrogate?** No
 - Original Aircraft Name:**
 - Original Engine Name:**

40.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

40.3 Flight Operations

40.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft:** 68
 - Flight Operation Cycle Type:** DC (Destination Cycle)
 - Number of Annual Flight Operation Cycles for all Aircraft:** 1816
 - Number of Annual Trim Test(s) per Aircraft:** 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi [Idle] (mins):** 0
 - Approach [Approach] (mins):** 31.92
 - Climb Out [Intermediate] (mins):** 3.04
 - Takeoff [Military] (mins):** 3.04
 - Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins):** 0
 - Approach (mins):** 0
 - Intermediate (mins):** 0
 - Military (mins):** 0
 - AfterBurn (mins):** 0

40.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

41. Aircraft

41.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2034, add 241 T-7A Destination Cycles in Vance 1E MOA with 68 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.095791
N ₂ O	0.018689

Pollutant	Emissions Per Year (TONs)
CO ₂	2278.096858
CO ₂ e	2286.061635

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.095791
N ₂ O	0.018689

Pollutant	Emissions Per Year (TONs)
CO ₂	2278.096858
CO ₂ e	2286.061635

41.2 Aircraft & Engines

41.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

41.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

41.3 Flight Operations

41.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	68
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	241
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

41.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

42. Aircraft

42.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2034, remove 100 T-38C Destination Cycles in IR-145 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.014453
N ₂ O	-0.002820

Pollutant	Emissions Per Year (TONs)
CO ₂	-343.729112
CO ₂ e	-344.930872

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.014453
N ₂ O	-0.002820

Pollutant	Emissions Per Year (TONs)
CO ₂	-343.729112
CO ₂ e	-344.930872

42.2 Aircraft & Engines

42.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

42.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

42.3 Flight Operations

42.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 100
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

42.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

43. Aircraft

43.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2034, remove 53 T-38C Destination Cycles in IR-171 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006868
N ₂ O	-0.001340

Pollutant	Emissions Per Year (TONs)
CO ₂	-163.330592
CO ₂ e	-163.901635

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	-0.006868	CO ₂	-163.330592
N ₂ O	-0.001340	CO ₂ e	-163.901635

43.2 Aircraft & Engines

43.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

43.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

43.3 Flight Operations

43.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 53
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

43.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

44. Aircraft

44.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2034, remove 58 T-38C Destination Cycles in IR-175 with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008961
N ₂ O	-0.001748

Pollutant	Emissions Per Year (TONs)
CO ₂	-213.112049
CO ₂ e	-213.857141

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008961
N ₂ O	-0.001748

Pollutant	Emissions Per Year (TONs)
CO ₂	-213.112049
CO ₂ e	-213.857141

44.2 Aircraft & Engines

44.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

44.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

44.3 Flight Operations

44.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 58
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

44.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

45. Aircraft

45.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2034, remove 56 T-38C Destination Cycles in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007257
N ₂ O	-0.001416

Pollutant	Emissions Per Year (TONs)
CO ₂	-172.575720
CO ₂ e	-173.179086

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007257
N ₂ O	-0.001416

Pollutant	Emissions Per Year (TONs)
CO ₂	-172.575720
CO ₂ e	-173.179086

45.2 Aircraft & Engines

45.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

45.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

45.3 Flight Operations

45.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 56
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

45.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

46. Aircraft

46.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2034, remove 78 T-38C Destination Cycles in IR-185 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.012051
N ₂ O	-0.002351

Pollutant	Emissions Per Year (TONs)
CO ₂	-286.598963
CO ₂ e	-287.600982

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.012051
N ₂ O	-0.002351

Pollutant	Emissions Per Year (TONs)
CO ₂	-286.598963
CO ₂ e	-287.600982

46.2 Aircraft & Engines

46.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

46.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

46.3 Flight Operations

46.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
 Flight Operation Cycle Type: DC (Destination Cycle)
 Number of Annual Flight Operation Cycles for all Aircraft: 78
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
 Approach [Approach] (mins): 0
 Climb Out [Intermediate] (mins): 0
 Takeoff [Military] (mins): 31
 Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
 Approach (mins): 0
 Intermediate (mins): 0
 Military (mins): 0
 AfterBurn (mins): 0

46.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

47. Aircraft

47.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2034, remove 945 T-38C Destination Cycles in Vance 1A MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.051814
N ₂ O	-0.010109

Pollutant	Emissions Per Year (TONs)
CO ₂	-1232.242438
CO ₂ e	-1236.550655

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.051814
N ₂ O	-0.010109

Pollutant	Emissions Per Year (TONs)
CO ₂	-1232.242438
CO ₂ e	-1236.550655

47.2 Aircraft & Engines

47.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

47.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

47.3 Flight Operations

47.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	945
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3
Climb Out [Intermediate] (mins):	3.6
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

47.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

48. Aircraft

48.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2034, remove 847 T-38C Destination Cycles in Vance 1C MOA with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.079333
N ₂ O	-0.015478

Pollutant	Emissions Per Year (TONs)
CO ₂	-1886.700859
CO ₂ e	-1893.297220

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.079333
N ₂ O	-0.015478

Pollutant	Emissions Per Year (TONs)
CO ₂	-1886.700859
CO ₂ e	-1893.297220

48.2 Aircraft & Engines

48.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

48.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

48.3 Flight Operations

48.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	847
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.04
Climb Out [Intermediate] (mins):	31.92
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

48.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

49. Aircraft

49.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2034, remove 253 T-38C Destination Cycles in Vance 1E MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.044132
N ₂ O	-0.008610

Pollutant	Emissions Per Year (TONs)
CO ₂	-1049.559064
CO ₂ e	-1053.228576

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.044132
N ₂ O	-0.008610

Pollutant	Emissions Per Year (TONs)
CO ₂	-1049.559064
CO ₂ e	-1053.228576

49.2 Aircraft & Engines

49.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

49.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

49.3 Flight Operations

49.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		49
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		253
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		35
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

49.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

SUA ROI: Alternative 3 ACAM Report (Low Flight Patterns)

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Department of the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Vance AFB T-7A EIS: Alternative 3, SUA Low Flight Pattern

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2032

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

f. Point of Contact:

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the GCR are:

	applicable
X	not applicable

Total reasonably foreseeable net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving “steady state” (hsba.e., no net gain/loss in emission stabilized and the action is fully implemented) emissions. The ACAM analysis uses the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the *USAF Air Emissions Guide for Air Force Stationary Sources*, the *USAF Air Emissions Guide for Air Force Mobile Sources*, and the *USAF Air Emissions Guide for Air Force Transitory Sources*.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of the proposed Action’s potential impacts to local air quality. The insignificance indicators are trivial (de minimis) rate thresholds that have been demonstrated to have little to no impact to air quality. These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold and 25 ton/yr for lead for actions occurring in areas that are "Attainment" (hsba.e., not exceeding any National Ambient Air Quality Standard (NAAQS)). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutants is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQS. For further detail on insignificance indicators, refer to *Level II, Air Quality Quantitative Assessment, Insignificance Indicators*.

The action’s net emissions for every year through achieving steady state were compared against the Insignificance Indicators and are summarized below.

Analysis Summary:

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.328	250	No
NOx	22.625	250	No
CO	-10.115	250	No
SOx	0.361	250	No
PM 10	-0.304	250	No
PM 2.5	-0.274	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2033

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.385	250	No
NOx	136.731	250	No
CO	-43.213	250	No
SOx	2.769	250	No
PM 10	-1.188	250	No
PM 2.5	-1.075	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2034

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	15.188	250	No
NOx	240.510	250	No
CO	-54.050	250	No
SOx	5.587	250	No
PM 10	-1.293	250	No
PM 2.5	-1.178	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2035

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	15.992	250	No
NOx	252.184	250	Yes
CO	-53.385	250	No
SOx	5.966	250	No
PM 10	-1.236	250	No
PM 2.5	-1.128	250	No
Pb	0.000	25	No
NH3	0.000	250	No

2036 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	15.992	250	No
NOx	252.184	250	Yes
CO	-53.385	250	No
SOx	5.966	250	No
PM 10	-1.236	250	No
PM 2.5	-1.128	250	No
Pb	0.000	25	No
NH3	0.000	250	No

The steady state estimated annual net emissions associated with this action exceed the insignificance indicators, indicating a potential for a significant impact to air quality. Therefore, the ACAM analysis is inconclusive and further air quality impact assessment is needed.

Carolyn Hein, Contractor

Mar 19 2025

Name, Title

Date

SUA ROI: Alternative 3 ACAM Detail Report (Low Flight Patterns)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Vance AFB T-7A EIS: Alternative 3, SUA Low Flight Pattern

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2032

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

- Point of Contact

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-145)
3.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-171)
4.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-175)
5.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-181)
6.	Aircraft	2032: Add T-7A MTR Low-Altitude Operations (IR-185)
7.	Aircraft	2032: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
8.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-145)
9.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-171)
10.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-175)
11.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-181)
12.	Aircraft	2032: Remove T-38C MTR Low-Altitude Operations (IR-185)
13.	Aircraft	2032: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)
14.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-145)
15.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-171)
16.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-175)
17.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-181)
18.	Aircraft	2033: Add T-7A MTR Low-Altitude Operations (IR-185)
19.	Aircraft	2033: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
20.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-145)
21.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-171)
22.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-175)
23.	Aircraft	2033: Add T-38C MTR Low-Altitude Operations (IR-181)
24.	Aircraft	2033: Remove T-38C MTR Low-Altitude Operations (IR-185)
25.	Aircraft	2033: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)
26.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-145)
27.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-171)
28.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-175)
29.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-181)
30.	Aircraft	2034: Add T-7A MTR Low-Altitude Operations (IR-185)
31.	Aircraft	2034: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)
32.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-145)
33.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-171)
34.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-175)
35.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-181)
36.	Aircraft	2034: Remove T-38C MTR Low-Altitude Operations (IR-185)
37.	Aircraft	2034: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)
38.	Aircraft	2035: Add T-7A MTR Low-Altitude Operations (IR-145)
39.	Aircraft	2035: Add T-7A MTR Low-Altitude Operations (IR-171)
40.	Aircraft	2035: Add T-7A MTR Low-Altitude Operations (IR-175)
41.	Aircraft	2035: Add T-7A MTR Low-Altitude Operations (IR-181)
42.	Aircraft	2035: Add T-7A MTR Low-Altitude Operations (IR-185)
43.	Aircraft	2035: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2032, add 44 T-7A Low-Altitude Operations in IR-145 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.244201
SO _x	0.115108
NO _x	3.550055
CO	0.202246

Pollutant	Emissions Per Year (TONs)
PM 10	0.017212
PM 2.5	0.015061
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014491
N ₂ O	0.002827

Pollutant	Emissions Per Year (TONs)
CO ₂	344.617853
CO ₂ e	345.822720

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.244201
SO _x	0.115108
NO _x	3.550055
CO	0.202246

Pollutant	Emissions Per Year (TONs)
PM 10	0.017212
PM 2.5	0.015061
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.014491
N ₂ O	0.002827

Pollutant	Emissions Per Year (TONs)
CO ₂	344.617853
CO ₂ e	345.822720

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 44
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

2.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2032, add 23 T-7A Low-Altitude Operations in IR-171 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.114445
SO _x	0.053946
NO _x	1.663741
CO	0.094783

Pollutant	Emissions Per Year (TONs)
PM 10	0.008067
PM 2.5	0.007058
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.006791
N ₂ O	0.001325

Pollutant	Emissions Per Year (TONs)
CO ₂	161.505859
CO ₂ e	162.070523

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.114445
SO _x	0.053946
NO _x	1.663741
CO	0.094783

Pollutant	Emissions Per Year (TONs)
PM 10	0.008067
PM 2.5	0.007058
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.006791
N ₂ O	0.001325

Pollutant	Emissions Per Year (TONs)
CO ₂	161.505859
CO ₂ e	162.070523

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
 Engine Model: F404-GE-102
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
 Flight Operation Cycle Type: LFP (Low Flight Pattern)
 Number of Annual Flight Operation Cycles for all Aircraft: 23

Number of Annual Trim Test(s) per Aircraft:

0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2032, add 26 T-7A Low-Altitude Operations in IR-175 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.154252
SO _x	0.072709
NO _x	2.242433
CO	0.127751

Pollutant	Emissions Per Year (TONs)
PM 10	0.010872
PM 2.5	0.009513
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009153
N ₂ O	0.001786

Pollutant	Emissions Per Year (TONs)
CO ₂	217.681810
CO ₂ e	218.442878

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.154252
SO _x	0.072709

Pollutant	Emissions Per Year (TONs)
PM 10	0.010872
PM 2.5	0.009513

NO _x	2.242433
CO	0.127751

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009153
N ₂ O	0.001786

Pollutant	Emissions Per Year (TONs)
CO ₂	217.681810
CO ₂ e	218.442878

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 26
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0

Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2032, add 24 T-7A Low-Altitude Operations in IR-181 with 24 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.119421
SO _x	0.056291
NO _x	1.736077
CO	0.098904

Pollutant	Emissions Per Year (TONs)
PM 10	0.008417
PM 2.5	0.007365
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.119421
SO _x	0.056291
NO _x	1.736077
CO	0.098904

Pollutant	Emissions Per Year (TONs)
PM 10	0.008417
PM 2.5	0.007365
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		24
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2032, add 33 T-7A Low-Altitude Operations in IR-185 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.195782
SO _x	0.092285
NO _x	2.846165
CO	0.162145

Pollutant	Emissions Per Year (TONs)
PM 10	0.013800
PM 2.5	0.012075
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011618
N ₂ O	0.002267

Pollutant	Emissions Per Year (TONs)
CO ₂	276.288451
CO ₂ e	277.254422

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.195782
SO _x	0.092285
NO _x	2.846165
CO	0.162145

Pollutant	Emissions Per Year (TONs)
PM 10	0.013800
PM 2.5	0.012075
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.011618
N ₂ O	0.002267

Pollutant	Emissions Per Year (TONs)
CO ₂	276.288451
CO ₂ e	277.254422

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:

Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		33
Number of Annual Trim Test(s) per Aircraft:		0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0	
Approach [Approach] (mins):	0	
Climb Out [Intermediate] (mins):	0	
Takeoff [Military] (mins):	31	
Takeoff [After Burn] (mins):	0	

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0	
Approach (mins):	0	
Intermediate (mins):	0	
Military (mins):	0	
AfterBurn (mins):	0	

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2032, add 116 T-7A Low-Altitude Operations in Vance 1E MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.777002
SO _x	0.366252
NO _x	11.295631
CO	0.643509

Pollutant	Emissions Per Year (TONs)
PM 10	0.054767
PM 2.5	0.047921
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.777002

Pollutant	Emissions Per Year (TONs)
PM 10	0.054767

SO _x	0.366252
NO _x	11.295631
CO	0.643509

PM 2.5	0.047921
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 116
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2032, remove 35 T-38C Low-Altitude Operations in IR-145 with 63 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.028166
SO _x	-0.040184
NO _x	-0.072106
CO	-1.163829

Pollutant	Emissions Per Year (TONs)
PM 10	-0.042437
PM 2.5	-0.037931
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005059
N ₂ O	-0.000987

Pollutant	Emissions Per Year (TONs)
CO ₂	-120.305189
CO ₂ e	-120.725805

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.028166
SO _x	-0.040184
NO _x	-0.072106
CO	-1.163829

Pollutant	Emissions Per Year (TONs)
PM 10	-0.042437
PM 2.5	-0.037931
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005059
N ₂ O	-0.000987

Pollutant	Emissions Per Year (TONs)
CO ₂	-120.305189
CO ₂ e	-120.725805

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63

Flight Operation Cycle Type: LFP (Low Flight Pattern)

Number of Annual Flight Operation Cycles for all Aircraft: 35

Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins): 0

Climb Out [Intermediate] (mins): 0

Takeoff [Military] (mins): 29

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0

Approach (mins): 0

Intermediate (mins): 0

Military (mins): 0

AfterBurn (mins): 0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MTR Low-Altitude Operations (IR-171)

- **Activity Description:**

In 2032, remove 28 T-38C Low-Altitude Operations in IR-171 with 63 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.020202
SO _x	-0.028822
NO _x	-0.051717
CO	-0.834747

Pollutant	Emissions Per Year (TONs)
PM 10	-0.030438
PM 2.5	-0.027205
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003628
N ₂ O	-0.000708

Pollutant	Emissions Per Year (TONs)
CO ₂	-86.287860
CO ₂ e	-86.589543

- **Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	-0.020202
SO _x	-0.028822
NO _x	-0.051717
CO	-0.834747

Pollutant	Emissions Per Year (TONs)
PM 10	-0.030438
PM 2.5	-0.027205
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003628
N ₂ O	-0.000708

Pollutant	Emissions Per Year (TONs)
CO ₂	-86.287860
CO ₂ e	-86.589543

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	28
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2032, remove 20 T-38C Low-Altitude Operations in IR-175 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.017205
SO _x	-0.024546
NO _x	-0.044045
CO	-0.710911

Pollutant	Emissions Per Year (TONs)
PM 10	-0.025922
PM 2.5	-0.023169
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003090
N ₂ O	-0.000603

Pollutant	Emissions Per Year (TONs)
CO ₂	-73.486914
CO ₂ e	-73.743842

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.017205
SO _x	-0.024546
NO _x	-0.044045
CO	-0.710911

Pollutant	Emissions Per Year (TONs)
PM 10	-0.025922
PM 2.5	-0.023169
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003090
N ₂ O	-0.000603

Pollutant	Emissions Per Year (TONs)
CO ₂	-73.486914
CO ₂ e	-73.743842

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
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Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	20
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11. Aircraft

11.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Remove

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MTR Low-Altitude Operations (IR-181)

- **Activity Description:**

In 2032, remove 148 T-38C Low-Altitude Operations in IR-181 with 63 aircraft.

- **Activity Start Date**

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.106782
SO _x	-0.152342
NO _x	-0.273362
CO	-4.412232

Pollutant	Emissions Per Year (TONs)
PM 10	-0.160885
PM 2.5	-0.143800
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019178
N ₂ O	-0.003742

Pollutant	Emissions Per Year (TONs)
CO ₂	-456.092973
CO ₂ e	-457.687585

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.106782
SO _x	-0.152342
NO _x	-0.273362
CO	-4.412232

Pollutant	Emissions Per Year (TONs)
PM 10	-0.160885
PM 2.5	-0.143800
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019178
N ₂ O	-0.003742

Pollutant	Emissions Per Year (TONs)
CO ₂	-456.092973
CO ₂ e	-457.687585

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	148
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2032, remove 20 T-38C Low-Altitude Operations in IR-185 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.017205
SO _x	-0.024546
NO _x	-0.044045
CO	-0.710911

Pollutant	Emissions Per Year (TONs)
PM 10	-0.025922
PM 2.5	-0.023169
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003090
N ₂ O	-0.000603

Pollutant	Emissions Per Year (TONs)
CO ₂	-73.486914
CO ₂ e	-73.743842

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.017205
SO _x	-0.024546
NO _x	-0.044045
CO	-0.710911

Pollutant	Emissions Per Year (TONs)
PM 10	-0.025922
PM 2.5	-0.023169
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003090
N ₂ O	-0.000603

Pollutant	Emissions Per Year (TONs)
CO ₂	-73.486914
CO ₂ e	-73.743842

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		63
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		20
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		31
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2032, remove 90 T-38C Low-Altitude Operations in Vance 1E MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.087413
SO _x	-0.124709
NO _x	-0.223776
CO	-3.611885

Pollutant	Emissions Per Year (TONs)
PM 10	-0.131702
PM 2.5	-0.117716
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015699
N ₂ O	-0.003063

Pollutant	Emissions Per Year (TONs)
CO ₂	-373.360932
CO _{2e}	-374.666292

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.087413
SO _x	-0.124709
NO _x	-0.223776
CO	-3.611885

Pollutant	Emissions Per Year (TONs)
PM 10	-0.131702
PM 2.5	-0.117716
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015699
N ₂ O	-0.003063

Pollutant	Emissions Per Year (TONs)
CO ₂	-373.360932
CO _{2e}	-374.666292

13.2 Aircraft & Engines

13.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

13.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:

63

Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		90
Number of Annual Trim Test(s) per Aircraft:		0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		35
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2033, add 219 T-7A Low-Altitude Operations in IR-145 with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.215454
SO _x	0.572923
NO _x	17.669593
CO	1.006631

Pollutant	Emissions Per Year (TONs)
PM 10	0.085671
PM 2.5	0.074962
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.072124
N ₂ O	0.014071

Pollutant	Emissions Per Year (TONs)
CO ₂	1715.257041
CO ₂ e	1721.253994

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	1.215454
SO _x	0.572923
NO _x	17.669593
CO	1.006631

PM 10	0.085671
PM 2.5	0.074962
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.072124
N ₂ O	0.014071

Pollutant	Emissions Per Year (TONs)
CO ₂	1715.257041
CO ₂ e	1721.253994

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

14.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 72
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 219
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2033, add 115 T-7A Low-Altitude Operations in IR-171 with 72 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.572226
SO _x	0.269728
NO _x	8.318703
CO	0.473914

Pollutant	Emissions Per Year (TONs)
PM 10	0.040333
PM 2.5	0.035291
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.033955
N ₂ O	0.006625

Pollutant	Emissions Per Year (TONs)
CO ₂	807.529295
CO ₂ e	810.352613

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.572226
SO _x	0.269728
NO _x	8.318703
CO	0.473914

Pollutant	Emissions Per Year (TONs)
PM 10	0.040333
PM 2.5	0.035291
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.033955
N ₂ O	0.006625

Pollutant	Emissions Per Year (TONs)
CO ₂	807.529295
CO ₂ e	810.352613

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
 Engine Model: F404-GE-102
 Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**
- Is Aircraft & Engine a Surrogate?** No
- Original Aircraft Name:**
- Original Engine Name:**

15.2.2 Aircraft & Engines Emission Factor(s)

- **Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)**
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- **Flight Operations**
- Number of Aircraft:** 72
- Flight Operation Cycle Type:** LFP (Low Flight Pattern)
- Number of Annual Flight Operation Cycles for all Aircraft:** 115
- Number of Annual Trim Test(s) per Aircraft:** 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
- Taxi [Idle] (mins):** 0
- Approach [Approach] (mins):** 0
- Climb Out [Intermediate] (mins):** 0
- Takeoff [Military] (mins):** 26
- Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
- Idle (mins):** 0
- Approach (mins):** 0
- Intermediate (mins):** 0
- Military (mins):** 0
- AfterBurn (mins):** 0

15.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

16. Aircraft

16.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MTR Low-Altitude Operations (IR-175)

- **Activity Description:**

In 2033, add 130 T-7A Low-Altitude Operations in IR-175 with 72 aircraft.

- **Activity Start Date**

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.771261
SO _x	0.363546
NO _x	11.212165
CO	0.638754

Pollutant	Emissions Per Year (TONs)
PM 10	0.054362
PM 2.5	0.047567
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.045766
N ₂ O	0.008929

Pollutant	Emissions Per Year (TONs)
CO ₂	1088.409050
CO ₂ e	1092.214391

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.771261
SO _x	0.363546
NO _x	11.212165
CO	0.638754

Pollutant	Emissions Per Year (TONs)
PM 10	0.054362
PM 2.5	0.047567
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.045766
N ₂ O	0.008929

Pollutant	Emissions Per Year (TONs)
CO ₂	1088.409050
CO ₂ e	1092.214391

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

16.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	72
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	130
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2033, add 120 T-7A Low-Altitude Operations in IR-181 with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.597105
SO _x	0.281455
NO _x	8.680386
CO	0.494519

Pollutant	Emissions Per Year (TONs)
PM 10	0.042087
PM 2.5	0.036826
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.035432
N ₂ O	0.006913

Pollutant	Emissions Per Year (TONs)
CO ₂	842.639264
CO ₂ e	845.585335

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.597105
SO _x	0.281455
NO _x	8.680386
CO	0.494519

Pollutant	Emissions Per Year (TONs)
PM 10	0.042087
PM 2.5	0.036826
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.035432
N ₂ O	0.006913

Pollutant	Emissions Per Year (TONs)
CO ₂	842.639264
CO ₂ e	845.585335

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 72
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 120
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2033, add 167 T-7A Low-Altitude Operations in IR-185 with 72 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.990774
SO _x	0.467017
NO _x	14.403320
CO	0.820553

Pollutant	Emissions Per Year (TONs)
PM 10	0.069834
PM 2.5	0.061105
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.058792
N ₂ O	0.011470

Pollutant	Emissions Per Year (TONs)
CO ₂	1398.187010
CO ₂ e	1403.075410

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.990774
SO _x	0.467017
NO _x	14.403320
CO	0.820553

Pollutant	Emissions Per Year (TONs)
PM 10	0.069834
PM 2.5	0.061105
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.058792
N ₂ O	0.011470

Pollutant	Emissions Per Year (TONs)
CO ₂	1398.187010
CO ₂ e	1403.075410

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
 Engine Model: F404-GE-102

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
 - Is Aircraft & Engine a Surrogate?** No
 - Original Aircraft Name:**
 - Original Engine Name:**

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)
 Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft:** 72
 - Flight Operation Cycle Type:** LFP (Low Flight Pattern)
 - Number of Annual Flight Operation Cycles for all Aircraft:** 167
 - Number of Annual Trim Test(s) per Aircraft:** 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi [Idle] (mins):** 0
 - Approach [Approach] (mins):** 0
 - Climb Out [Intermediate] (mins):** 0
 - Takeoff [Military] (mins):** 31
 - Takeoff [After Burn] (mins):** 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins):** 0
 - Approach (mins):** 0
 - Intermediate (mins):** 0
 - Military (mins):** 0
 - AfterBurn (mins):** 0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AE_{PS_{POL}} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AE_{PS_{POL}}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PS_{IDLE}} + AE_{PS_{APPROACH}} + AE_{PS_{INTERMEDIATE}} + AE_{PS_{MILITARY}} + AE_{PS_{AFTERBURN}}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AE_{PS_{IDLE}}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AE_{PS_{APPROACH}}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AE_{PS_{INTERMEDIATE}}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AE_{PS_{MILITARY}}$: Aircraft Emissions for Military Power Setting (TONs)
 $AE_{PS_{AFTERBURN}}$: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2033, add 578 T-7A Low-Altitude Operations in Vance 1E MOA with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	3.871616
SO _x	1.824947
NO _x	56.283400
CO	3.206448

Pollutant	Emissions Per Year (TONs)
PM 10	0.272889
PM 2.5	0.238778
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.229739
N ₂ O	0.044822

Pollutant	Emissions Per Year (TONs)
CO ₂	5463.651385
CO ₂ e	5482.753630

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	3.871616
SO _x	1.824947
NO _x	56.283400
CO	3.206448

Pollutant	Emissions Per Year (TONs)
PM 10	0.272889
PM 2.5	0.238778
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.229739
N ₂ O	0.044822

Pollutant	Emissions Per Year (TONs)
CO ₂	5463.651385
CO ₂ e	5482.753630

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	72
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	578
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2033, remove 198 T-38C Low-Altitude Operations in IR-145 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.159341
SO _x	-0.227326
NO _x	-0.407912
CO	-6.583949

Pollutant	Emissions Per Year (TONs)
PM 10	-0.240073
PM 2.5	-0.214579
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.028618
N ₂ O	-0.005583

Pollutant	Emissions Per Year (TONs)
CO ₂	-680.583642
CO ₂ e	-682.963127

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.159341
SO _x	-0.227326
NO _x	-0.407912
CO	-6.583949

Pollutant	Emissions Per Year (TONs)
PM 10	-0.240073
PM 2.5	-0.214579
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.028618
N ₂ O	-0.005583

Pollutant	Emissions Per Year (TONs)
CO ₂	-680.583642
CO ₂ e	-682.963127

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 198
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2033, remove 104 T-38C Low-Altitude Operations in IR-171 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.075036
SO _x	-0.107051
NO _x	-0.192092
CO	-3.100488

Pollutant	Emissions Per Year (TONs)
PM 10	-0.113054
PM 2.5	-0.101048
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013476
N ₂ O	-0.002629

Pollutant	Emissions Per Year (TONs)
CO ₂	-320.497765
CO ₂ e	-321.618303

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.075036
SO _x	-0.107051
NO _x	-0.192092
CO	-3.100488

Pollutant	Emissions Per Year (TONs)
PM 10	-0.113054
PM 2.5	-0.101048
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	-0.013476	CO ₂	-320.497765
N ₂ O	-0.002629	CO ₂ e	-321.618303

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 104
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2033, remove 118 T-38C Low-Altitude Operations in IR-175 with 14 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.101510
SO _x	-0.144820
NO _x	-0.259864
CO	-4.194373

Pollutant	Emissions Per Year (TONs)
PM 10	-0.152941
PM 2.5	-0.136699
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018231
N ₂ O	-0.003557

Pollutant	Emissions Per Year (TONs)
CO ₂	-433.572790
CO ₂ e	-435.088665

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.101510
SO _x	-0.144820
NO _x	-0.259864
CO	-4.194373

Pollutant	Emissions Per Year (TONs)
PM 10	-0.152941
PM 2.5	-0.136699
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.018231
N ₂ O	-0.003557

Pollutant	Emissions Per Year (TONs)
CO ₂	-433.572790
CO ₂ e	-435.088665

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 118
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2033, add 18 T-38C Low-Altitude Operations in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.012987
SO _x	0.018528
NO _x	0.033247
CO	0.536623

Pollutant	Emissions Per Year (TONs)
PM 10	0.019567
PM 2.5	0.017489
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002332
N ₂ O	0.000455

Pollutant	Emissions Per Year (TONs)
CO ₂	55.470767
CO ₂ e	55.664706

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.012987
SO _x	0.018528
NO _x	0.033247
CO	0.536623

Pollutant	Emissions Per Year (TONs)
PM 10	0.019567
PM 2.5	0.017489
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.002332
N ₂ O	0.000455

Pollutant	Emissions Per Year (TONs)
CO ₂	55.470767
CO ₂ e	55.664706

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R

Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 18
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2033, remove 151 T-38C Low-Altitude Operations in IR-185 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.129898
SO _x	-0.185321
NO _x	-0.332538
CO	-5.367375

Pollutant	Emissions Per Year (TONs)
PM 10	-0.195713
PM 2.5	-0.174929
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.023330
N ₂ O	-0.004552

Pollutant	Emissions Per Year (TONs)
CO ₂	-554.826198
CO ₂ e	-556.766004

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.129898
SO _x	-0.185321
NO _x	-0.332538
CO	-5.367375

Pollutant	Emissions Per Year (TONs)
PM 10	-0.195713
PM 2.5	-0.174929
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.023330
N ₂ O	-0.004552

Pollutant	Emissions Per Year (TONs)
CO ₂	-554.826198
CO ₂ e	-556.766004

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 151
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2033, remove 524 T-38C Low-Altitude Operations in Vance 1E MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.508935
SO _x	-0.726081
NO _x	-1.302874
CO	-21.029194

Pollutant	Emissions Per Year (TONs)
PM 10	-0.766795
PM 2.5	-0.685366
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091405
N ₂ O	-0.017833

Pollutant	Emissions Per Year (TONs)
CO ₂	-2173.790315
CO ₂ e	-2181.390411

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.508935
SO _x	-0.726081
NO _x	-1.302874
CO	-21.029194

Pollutant	Emissions Per Year (TONs)
PM 10	-0.766795
PM 2.5	-0.685366
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091405
N ₂ O	-0.017833

Pollutant	Emissions Per Year (TONs)
CO ₂	-2173.790315
CO ₂ e	-2181.390411

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	524
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2034, add 197 T-7A Low-Altitude Operations in IR-145 with 99 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	1.093353
SO _x	0.515369
NO _x	15.894566
CO	0.905509

Pollutant	Emissions Per Year (TONs)
PM 10	0.077065
PM 2.5	0.067431
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.064879
N ₂ O	0.012658

Pollutant	Emissions Per Year (TONs)
CO ₂	1542.948115
CO ₂ e	1548.342634

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.093353
SO _x	0.515369
NO _x	15.894566
CO	0.905509

Pollutant	Emissions Per Year (TONs)
PM 10	0.077065
PM 2.5	0.067431
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.064879
N ₂ O	0.012658

Pollutant	Emissions Per Year (TONs)
CO ₂	1542.948115
CO ₂ e	1548.342634

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations	
Number of Aircraft:	99
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	197
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)

- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2034, add 103 T-7A Low-Altitude Operations in IR-171 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.512515
SO _x	0.241582
NO _x	7.450665
CO	0.424462

Pollutant	Emissions Per Year (TONs)
PM 10	0.036124
PM 2.5	0.031609
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.030412
N ₂ O	0.005933

Pollutant	Emissions Per Year (TONs)
CO ₂	723.265369
CO ₂ e	725.794079

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.512515
SO _x	0.241582
NO _x	7.450665
CO	0.424462

Pollutant	Emissions Per Year (TONs)
PM 10	0.036124
PM 2.5	0.031609
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.030412
N ₂ O	0.005933

Pollutant	Emissions Per Year (TONs)
CO ₂	723.265369
CO ₂ e	725.794079

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 103
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2034, add 117 T-7A Low-Altitude Operations in IR-175 with 99 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.694135
SO _x	0.327191
NO _x	10.090949
CO	0.574878

Pollutant	Emissions Per Year (TONs)
PM 10	0.048926
PM 2.5	0.042810
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.041189
N ₂ O	0.008036

Pollutant	Emissions Per Year (TONs)
CO ₂	979.568145
CO ₂ e	982.992952

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.694135
SO _x	0.327191
NO _x	10.090949
CO	0.574878

Pollutant	Emissions Per Year (TONs)
PM 10	0.048926
PM 2.5	0.042810
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.041189
N ₂ O	0.008036

Pollutant	Emissions Per Year (TONs)
CO ₂	979.568145
CO ₂ e	982.992952

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

28.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	117
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

28.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

29. Aircraft

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK;
 Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2034, add 108 T-7A Low-Altitude Operations in IR-181 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.537395
SO _x	0.253309
NO _x	7.812347
CO	0.445067

Pollutant	Emissions Per Year (TONs)
PM 10	0.037878
PM 2.5	0.033143
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.031889
N ₂ O	0.006221

Pollutant	Emissions Per Year (TONs)
CO ₂	758.375338
CO ₂ e	761.026801

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.537395
SO _x	0.253309
NO _x	7.812347
CO	0.445067

Pollutant	Emissions Per Year (TONs)
PM 10	0.037878
PM 2.5	0.033143
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.031889
N ₂ O	0.006221

Pollutant	Emissions Per Year (TONs)
CO ₂	758.375338
CO ₂ e	761.026801

29.2 Aircraft & Engines

29.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

29.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

29.3 Flight Operations

29.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	108
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

29.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

30. Aircraft

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2034, add 150 T-7A Low-Altitude Operations in IR-185 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.889917
SO _x	0.419476
NO _x	12.937114
CO	0.737023

Pollutant	Emissions Per Year (TONs)
PM 10	0.062725
PM 2.5	0.054885
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.052807
N ₂ O	0.010303

Pollutant	Emissions Per Year (TONs)
CO ₂	1255.856596
CO ₂ e	1260.247374

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.889917
SO _x	0.419476
NO _x	12.937114
CO	0.737023

Pollutant	Emissions Per Year (TONs)
PM 10	0.062725
PM 2.5	0.054885
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.052807
N ₂ O	0.010303

Pollutant	Emissions Per Year (TONs)
CO ₂	1255.856596
CO ₂ e	1260.247374

30.2 Aircraft & Engines

30.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

30.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

30.3 Flight Operations

30.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 150
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

30.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

31. Aircraft

31.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2034, add 520 T-7A Low-Altitude Operations in Vance 1E MOA with 99 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	3.483114
SO _x	1.641820
NO _x	50.635585
CO	2.884694

Pollutant	Emissions Per Year (TONs)
PM 10	0.245506
PM 2.5	0.214818
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.206685
N ₂ O	0.040324

Pollutant	Emissions Per Year (TONs)
CO ₂	4915.395709
CO ₂ e	4932.581120

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	3.483114
SO _x	1.641820
NO _x	50.635585
CO	2.884694

Pollutant	Emissions Per Year (TONs)
PM 10	0.245506
PM 2.5	0.214818
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.206685
N ₂ O	0.040324

Pollutant	Emissions Per Year (TONs)
CO ₂	4915.395709
CO ₂ e	4932.581120

31.2 Aircraft & Engines

31.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

31.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

31.3 Flight Operations

31.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	520
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

31.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

32. Aircraft

32.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2034, remove 77 T-38C Low-Altitude Operations in IR-145 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.061966
SO _x	-0.088404
NO _x	-0.158632
CO	-2.560425

Pollutant	Emissions Per Year (TONs)
PM 10	-0.093362
PM 2.5	-0.083447
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011129
N ₂ O	-0.002171

Pollutant	Emissions Per Year (TONs)
CO ₂	-264.671416
CO ₂ e	-265.596771

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.061966
SO _x	-0.088404
NO _x	-0.158632
CO	-2.560425

Pollutant	Emissions Per Year (TONs)
PM 10	-0.093362
PM 2.5	-0.083447
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011129
N ₂ O	-0.002171

Pollutant	Emissions Per Year (TONs)
CO ₂	-264.671416
CO ₂ e	-265.596771

32.2 Aircraft & Engines

32.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

32.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17

Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

32.3 Flight Operations

32.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	77
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

32.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

33. Aircraft

33.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-171)

- Activity Description:

In 2034, remove 40 T-38C Low-Altitude Operations in IR-171 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.028860
SO _x	-0.041174
NO _x	-0.073882
CO	-1.192495

Pollutant	Emissions Per Year (TONs)
PM 10	-0.043482
PM 2.5	-0.038865
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005183
N ₂ O	-0.001011

Pollutant	Emissions Per Year (TONs)
CO ₂	-123.268371
CO ₂ e	-123.699347

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.028860
SO _x	-0.041174
NO _x	-0.073882
CO	-1.192495

Pollutant	Emissions Per Year (TONs)
PM 10	-0.043482
PM 2.5	-0.038865
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005183
N ₂ O	-0.001011

Pollutant	Emissions Per Year (TONs)
CO ₂	-123.268371
CO ₂ e	-123.699347

33.2 Aircraft & Engines

33.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

33.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64

Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

33.3 Flight Operations

33.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	40
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

33.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

34. Aircraft

34.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2034, remove 46 T-38C Low-Altitude Operations in IR-175 with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.039572

Pollutant	Emissions Per Year (TONs)
PM 10	-0.059621

SO _x	-0.056455
NO _x	-0.101303
CO	-1.635094

PM 2.5	-0.053290
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007107
N ₂ O	-0.001387

Pollutant	Emissions Per Year (TONs)
CO ₂	-169.019901
CO ₂ e	-169.610836

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.039572
SO _x	-0.056455
NO _x	-0.101303
CO	-1.635094

Pollutant	Emissions Per Year (TONs)
PM 10	-0.059621
PM 2.5	-0.053290
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007107
N ₂ O	-0.001387

Pollutant	Emissions Per Year (TONs)
CO ₂	-169.019901
CO ₂ e	-169.610836

34.2 Aircraft & Engines

34.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

34.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

34.3 Flight Operations

34.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		49
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		46
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

34.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

35. Aircraft

35.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2034, remove 42 T-38C Low-Altitude Operations in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.030303
SO _x	-0.043232
NO _x	-0.077576
CO	-1.252120

Pollutant	Emissions Per Year (TONs)
PM 10	-0.045657
PM 2.5	-0.040808
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
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CH ₄	-0.005442
N ₂ O	-0.001062

CO ₂	-129.431790
CO _{2e}	-129.884315

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.030303
SO _x	-0.043232
NO _x	-0.077576
CO	-1.252120

Pollutant	Emissions Per Year (TONs)
PM 10	-0.045657
PM 2.5	-0.040808
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005442
N ₂ O	-0.001062

Pollutant	Emissions Per Year (TONs)
CO ₂	-129.431790
CO _{2e}	-129.884315

35.2 Aircraft & Engines

35.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

35.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO _{2e}
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

35.3 Flight Operations

35.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)

Number of Annual Flight Operation Cycles for all Aircraft: 42
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

35.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

36. Aircraft

36.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Low-Altitude Operations (IR-185)

- Activity Description:

In 2034, remove 58 T-38C Low-Altitude Operations in IR-185 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.049895
SO _x	-0.071183
NO _x	-0.127730
CO	-2.061641

Pollutant	Emissions Per Year (TONs)
PM 10	-0.075174
PM 2.5	-0.067191
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008961
N ₂ O	-0.001748

Pollutant	Emissions Per Year (TONs)
CO ₂	-213.112049
CO ₂ e	-213.857141

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.049895

Pollutant	Emissions Per Year (TONs)
PM 10	-0.075174

SO _x	-0.071183
NO _x	-0.127730
CO	-2.061641

PM 2.5	-0.067191
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.008961
N ₂ O	-0.001748

Pollutant	Emissions Per Year (TONs)
CO ₂	-213.112049
CO ₂ e	-213.857141

36.2 Aircraft & Engines

36.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

36.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

36.3 Flight Operations

36.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 58
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

36.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

37. Aircraft

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2034, remove 202 T-38C Low-Altitude Operations in Vance 1E MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	-0.196193
SO _x	-0.279901
NO _x	-0.502253
CO	-8.106674

Pollutant	Emissions Per Year (TONs)
PM 10	-0.295597
PM 2.5	-0.264206
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035236
N ₂ O	-0.006875

Pollutant	Emissions Per Year (TONs)
CO ₂	-837.987870
CO ₂ e	-840.917678

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.196193
SO _x	-0.279901
NO _x	-0.502253
CO	-8.106674

Pollutant	Emissions Per Year (TONs)
PM 10	-0.295597
PM 2.5	-0.264206
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035236

Pollutant	Emissions Per Year (TONs)
CO ₂	-837.987870

N ₂ O	-0.006875
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CO ₂ e	-840.917678
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37.2 Aircraft & Engines

37.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

37.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

37.3 Flight Operations

37.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 202
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

37.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

38. Aircraft

38.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035: Add T-7A MTR Low-Altitude Operations (IR-145)

- Activity Description:

In 2035, add 22 T-7A Low-Altitude Operations in IR-145 with 99 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2035

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.122100
SO _x	0.057554
NO _x	1.775028
CO	0.101123

Pollutant	Emissions Per Year (TONs)
PM 10	0.008606
PM 2.5	0.007530
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007245
N ₂ O	0.001414

Pollutant	Emissions Per Year (TONs)
CO ₂	172.308927
CO ₂ e	172.911360

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.122100
SO _x	0.057554
NO _x	1.775028
CO	0.101123

Pollutant	Emissions Per Year (TONs)
PM 10	0.008606
PM 2.5	0.007530
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007245
N ₂ O	0.001414

Pollutant	Emissions Per Year (TONs)
CO ₂	172.308927
CO ₂ e	172.911360

38.2 Aircraft & Engines

38.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

38.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

38.3 Flight Operations

38.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	22
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

38.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

39. Aircraft

39.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2035: Add T-7A MTR Low-Altitude Operations (IR-171)

- **Activity Description:**

In 2035, add 11 T-7A Low-Altitude Operations in IR-171 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.054735
SO _x	0.025800
NO _x	0.795702
CO	0.045331

Pollutant	Emissions Per Year (TONs)
PM 10	0.003858
PM 2.5	0.003376
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003248
N ₂ O	0.000634

Pollutant	Emissions Per Year (TONs)
CO ₂	77.241933
CO ₂ e	77.511989

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.054735
SO _x	0.025800
NO _x	0.795702
CO	0.045331

Pollutant	Emissions Per Year (TONs)
PM 10	0.003858
PM 2.5	0.003376
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003248
N ₂ O	0.000634

Pollutant	Emissions Per Year (TONs)
CO ₂	77.241933
CO ₂ e	77.511989

39.2 Aircraft & Engines

39.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

39.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

39.3 Flight Operations

39.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft:	11
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

39.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

40. Aircraft

40.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035: Add T-7A MTR Low-Altitude Operations (IR-175)

- Activity Description:

In 2035, add 13 T-7A Low-Altitude Operations in IR-175 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.077126
SO _x	0.036355
NO _x	1.121217
CO	0.063875

Pollutant	Emissions Per Year (TONs)
PM 10	0.005436
PM 2.5	0.004757
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004577
N ₂ O	0.000893

Pollutant	Emissions Per Year (TONs)
CO ₂	108.840905
CO ₂ e	109.221439

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.077126
SO _x	0.036355
NO _x	1.121217
CO	0.063875

Pollutant	Emissions Per Year (TONs)
PM 10	0.005436
PM 2.5	0.004757
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004577
N ₂ O	0.000893

Pollutant	Emissions Per Year (TONs)
CO ₂	108.840905
CO ₂ e	109.221439

40.2 Aircraft & Engines

40.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

40.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

40.3 Flight Operations

40.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 13
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

40.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

41. Aircraft

41.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035: Add T-7A MTR Low-Altitude Operations (IR-181)

- Activity Description:

In 2035, add 12 T-7A Low-Altitude Operations in IR-181 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.059711
SO _x	0.028145
NO _x	0.868039
CO	0.049452

Pollutant	Emissions Per Year (TONs)
PM 10	0.004209
PM 2.5	0.003683
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003543
N ₂ O	0.000691

Pollutant	Emissions Per Year (TONs)
CO ₂	84.263926
CO ₂ e	84.558533

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.059711
SO _x	0.028145
NO _x	0.868039
CO	0.049452

Pollutant	Emissions Per Year (TONs)
PM 10	0.004209
PM 2.5	0.003683
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003543
N ₂ O	0.000691

Pollutant	Emissions Per Year (TONs)
CO ₂	84.263926
CO ₂ e	84.558533

41.2 Aircraft & Engines

41.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

41.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

41.3 Flight Operations

41.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 12
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

41.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)

60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

42. Aircraft

42.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2035: Add T-7A MTR Low-Altitude Operations (IR-185)

- **Activity Description:**

In 2035, add 17 T-7A Low-Altitude Operations in IR-185 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.100857
SO _x	0.047541
NO _x	1.466206
CO	0.083529

Pollutant	Emissions Per Year (TONs)
PM 10	0.007109
PM 2.5	0.006220
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005985
N ₂ O	0.001168

Pollutant	Emissions Per Year (TONs)
CO ₂	142.330414
CO ₂ e	142.828036

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.100857
SO _x	0.047541
NO _x	1.466206
CO	0.083529

Pollutant	Emissions Per Year (TONs)
PM 10	0.007109
PM 2.5	0.006220
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005985
N ₂ O	0.001168

Pollutant	Emissions Per Year (TONs)
CO ₂	142.330414
CO ₂ e	142.828036

42.2 Aircraft & Engines

42.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

42.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

42.3 Flight Operations

42.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		99
Flight Operation Cycle Type:	LFP (Low Flight Pattern)	
Number of Annual Flight Operation Cycles for all Aircraft:		17
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):		0
Approach [Approach] (mins):		0
Climb Out [Intermediate] (mins):		0
Takeoff [Military] (mins):		31
Takeoff [After Burn] (mins):		0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):		0
Approach (mins):		0
Intermediate (mins):		0
Military (mins):		0
AfterBurn (mins):		0

42.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

43. Aircraft

43.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035: Add T-7A MOA Low-Altitude Operations (Vance 1E MOA)

- Activity Description:

In 2035, add 58 T-7A Low-Altitude Operations in Vance 1E MOA with 99 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2035

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.388501
SO _x	0.183126
NO _x	5.647815
CO	0.321754

Pollutant	Emissions Per Year (TONs)
PM 10	0.027383
PM 2.5	0.023960
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.023053
N ₂ O	0.004498

Pollutant	Emissions Per Year (TONs)
CO ₂	548.255675
CO ₂ e	550.172510

- Activity Emissions of Criteria Pollutants [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.388501
SO _x	0.183126
NO _x	5.647815
CO	0.321754

Pollutant	Emissions Per Year (TONs)
PM 10	0.027383
PM 2.5	0.023960
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LFP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.023053
N ₂ O	0.004498

Pollutant	Emissions Per Year (TONs)
CO ₂	548.255675
CO ₂ e	550.172510

43.2 Aircraft & Engines

43.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

43.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

43.3 Flight Operations

43.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: LFP (Low Flight Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 58
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

43.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

SUA ROI: Alternative 3 GHG Report (Destination Cycles)

AIR CONFORMITY APPLICABILITY MODEL REPORT GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to estimate GHG emissions associated with the action. The analysis was performed in accordance with the Department of the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention* and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the GHG emissions analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Vance AFB T-7A EIS: Alternative 3, SUA Destination Cycle

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2032

e. Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

f. Point of Contact:

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action's start through the action's "steady state" (SS, net gain/loss in emission stabilized and the action is fully implemented) of emissions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO₂ equivalents (CO₂e). The CO₂e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG’s ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO₂. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO₂e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO₂e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO₂e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected steady state of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	CO₂	CH₄	N₂O	CO₂e	Threshold	Exceedance
2032	5,723	0.24064675	0.04695023	5,743	68,039	No
2033	22,131	0.93059314	0.18155893	22,209	68,039	No
2034	47,907	2.01440095	0.39301007	48,074	68,039	No
2035	51,262	2.15547398	0.42053345	51,441	68,039	No
2036 [SS Year]	51,262	2.15547398	0.42053345	51,441	68,039	No

The following U.S. and State’s GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. <https://statesummaries.ncics.org/downloads/>).

State’s Annual GHG Emissions (mton/yr)				
YEAR	CO₂	CH₄	N₂O	CO₂e
2032	94,683,042	1,117,798	43,525	137,515,492
2033	94,683,042	1,117,798	43,525	137,515,492
2034	94,683,042	1,117,798	43,525	137,515,492
2035	94,683,042	1,117,798	43,525	137,515,492
2036 [SS Year]	94,683,042	1,117,798	43,525	137,515,492

U.S. Annual GHG Emissions (mton/yr)				
YEAR	CO2	CH4	N2O	CO2e
2032	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2033	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2034	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2035	5,136,454,179	25,626,912	1,500,708	6,251,695,230
2036 [SS Year]	5,136,454,179	25,626,912	1,500,708	6,251,695,230

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (Rtba.e., global, national, and regional) and the degree (intensity) of the proposed action’s effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative’s annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action’s surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area’s ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action’s GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action’s net change in GHG emissions is compared relative to the state (where the action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action’s net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2032-2036	State Total	473,415,208	5,588,988	217,625	687,577,461
2032-2036	U.S. Total	25,682,270,895	128,134,558	7,503,538	31,258,476,148
2032-2036	Action	178,284	7.496589	1.462586	178,907
Percent of State Totals		0.03765915%	0.00013413%	0.00067207%	0.02601997%
Percent of U.S. Totals		0.00069419%	0.00000585%	0.00001949%	0.00057235%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00007669%.*

* Global value based on the U.S. emitting 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, <https://www.c2es.org/content/international-emissions>).

SUA ROI: Alternative 3 ACAM Detail Report (Destination Cycles)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANCE AFB

State: Oklahoma

County(s): Barber, KS; Clark, KS; Comanche, KS; Harper, KS; Alfalfa, OK; Beaver, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Harper, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Vance AFB T-7A EIS: Alternative 3, SUA Destination Cycle

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2032

- Action Purpose and Need:

The purpose is to continue the T-7A recapitalization program to prepare pilots to operate modern fourth and fifth generation aircraft. The need for the Proposed Action is to provide infrastructure and training systems to support the newer T-7A aircraft, allow for enhanced and improved flight and simulator training, and ensure DAF pilot training requirements are met. By 2031, more than 60 percent of the Combat Air Force will be comprised of fifth generation aircraft, requiring a modern, capable training platform with capabilities beyond those available with the T-38C. Additionally, training systems provided with the newer T-7A aircraft allow for enhanced and improved flight and simulator training. The T-7A recapitalization program will allow DAF to provide more efficient and effective instructor and pilot training for operating fourth and fifth generation aircraft. T-7A recapitalization at Vance AFB would allow DAF to continue the geographically phased T-7A recapitalization sequence, ensuring DAF pilot training requirements are met.

- Action Description:

The Proposed Action is recapitalization of the T-38C flight training program at Vance AFB with T-7A aircraft. Recapitalization entails replacement of all T-38C aircraft assigned to Vance with T-7A aircraft; transition of aircraft operations at Vance AFB and associated SUA from the T-38C to the T-7A; temporary changes to the number of personnel and dependents in the Vance AFB region; and construction of and upgrades to operations, support, and maintenance facilities to support pilot training and aircraft operation and maintenance.

For Alternative 1, Vance AFB would receive up to 68 T-7A aircraft and perform sufficient operations for sustaining pilot training while simultaneously phasing out the T-38C aircraft. Alternative 2 would also result in up to 68 T-7A aircraft being delivered to Vance AFB; however, T-7A operations would be performed at an operational tempo approximately 25 percent greater than Alternative 1 to cover a scenario in which DAF requires a surge or increase in pilot training operations above the current plan. For Alternative 3, Vance AFB would receive up to 99 T-7A aircraft and T-7A operations would be approximately 45 percent greater than aircraft operations for Alternative 1. The No Action Alternative would not implement T-7A recapitalization at Vance AFB.

- Point of Contact

Name: Carolyn Hein

Title: Contractor

Organization: HDR

Email:

Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-145)
3.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-171)
4.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-175)
5.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-181)
6.	Aircraft	2032: Add T-7A MTR Destination Cycles (IR-185)
7.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1A MOA)
8.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1C MOA)
9.	Aircraft	2032: Add T-7A MOA Destination Cycles (Vance 1E MOA)
10.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-145)
11.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-171)
12.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-175)
13.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-181)
14.	Aircraft	2032: Remove T-38C MTR Destination Cycles (IR-185)
15.	Aircraft	2032: Add T-38C MOA Destination Cycles (Vance 1A MOA)
16.	Aircraft	2032: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
17.	Aircraft	2032: Remove T-38C MOA Destination Cycles (Vance 1E MOA)
18.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-145)
19.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-171)
20.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-175)
21.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-181)
22.	Aircraft	2033: Add T-7A MTR Destination Cycles (IR-185)
23.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1A MOA)
24.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1C MOA)
25.	Aircraft	2033: Add T-7A MOA Destination Cycles (Vance 1E MOA)
26.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-145)
27.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-171)
28.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-175)
29.	Aircraft	2033: Add T-38C MTR Destination Cycles (IR-181)
30.	Aircraft	2033: Remove T-38C MTR Destination Cycles (IR-185)
31.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1A MOA)
32.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
33.	Aircraft	2033: Remove T-38C MOA Destination Cycles (Vance 1E MOA)
34.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-145)
35.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-171)
36.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-175)
37.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-181)
38.	Aircraft	2034: Add T-7A MTR Destination Cycles (IR-185)
39.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1A MOA)
40.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1C MOA)
41.	Aircraft	2034: Add T-7A MOA Destination Cycles (Vance 1E MOA)
42.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-145)
43.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-171)
44.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-175)
45.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-181)
46.	Aircraft	2034: Remove T-38C MTR Destination Cycles (IR-185)
47.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1A MOA)
48.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1C MOA)
49.	Aircraft	2034: Remove T-38C MOA Destination Cycles (Vance 1E MOA)
50.	Aircraft	2035: Add T-7A MTR Destination Cycles (IR-145)
51.	Aircraft	2035: Add T-7A MTR Destination Cycles (IR-171)
52.	Aircraft	2035: Add T-7A MTR Destination Cycles (IR-175)
53.	Aircraft	2035: Add T-7A MTR Destination Cycles (IR-181)

54.	Aircraft	2035: Add T-7A MTR Destination Cycles (IR-185)
55.	Aircraft	2035: Add T-7A MOA Destination Cycles (Vance 1A MOA)
56.	Aircraft	2035: Add T-7A MOA Destination Cycles (Vance 1C MOA)
57.	Aircraft	2035: Add T-7A MOA Destination Cycles (Vance 1E MOA)

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2032, add 46 T-7A Destination Cycles in IR-145 with 24 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.015149
N ₂ O	0.002956

Pollutant	Emissions Per Year (TONs)
CO ₂	360.282301
CO ₂ e	361.541935

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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CH ₄	0.015149
N ₂ O	0.002956

CO ₂	360.282301
CO ₂ e	361.541935

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 46
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Destination Cycles (IR-171)

- **Activity Description:**

In 2032, add 24 T-7A Destination Cycles in IR-171 with 24 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007086
N ₂ O	0.001383

Pollutant	Emissions Per Year (TONs)
CO ₂	168.527853
CO ₂ e	169.117067

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		24
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		24
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2032, add 27 T-7A Destination Cycles in IR-175 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009505
N ₂ O	0.001854

Pollutant	Emissions Per Year (TONs)
CO ₂	226.054187
CO ₂ e	226.844527

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.009505
N ₂ O	0.001854

Pollutant	Emissions Per Year (TONs)
CO ₂	226.054187
CO ₂ e	226.844527

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 27
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2032, add 25 T-7A Destination Cycles in IR-181 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007382
N ₂ O	0.001440

Pollutant	Emissions Per Year (TONs)
CO ₂	175.549847
CO ₂ e	176.163611

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007382
N ₂ O	0.001440

Pollutant	Emissions Per Year (TONs)
CO ₂	175.549847
CO ₂ e	176.163611

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 25
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2032, add 35 T-7A Destination Cycles in IR-185 with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.012322
N ₂ O	0.002404

Pollutant	Emissions Per Year (TONs)
CO ₂	293.033206
CO ₂ e	294.057721

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.012322
N ₂ O	0.002404

Pollutant	Emissions Per Year (TONs)
CO ₂	293.033206
CO ₂ e	294.057721

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	35
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2032, add 675 T-7A Destination Cycles in Vance 1A MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.086906
N ₂ O	0.016955

Pollutant	Emissions Per Year (TONs)
CO ₂	2066.790614
CO ₂ e	2074.016613

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.086906
N ₂ O	0.016955

Pollutant	Emissions Per Year (TONs)
CO ₂	2066.790614
CO ₂ e	2074.016613

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 675
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.6
Climb Out [Intermediate] (mins):	3
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

7.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2032, add 868 T-7A Destination Cycles in Vance 1C MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.126132
N ₂ O	0.024608

Pollutant	Emissions Per Year (TONs)
CO ₂	2999.681261
CO ₂ e	3010.168871

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	0.126132	CO ₂	2999.681261
N ₂ O	0.024608	CO ₂ e	3010.168871

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 868
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 31.92
Climb Out [Intermediate] (mins): 3.04
Takeoff [Military] (mins): 3.04
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0

AfterBurn (mins): 0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2032, add 116 T-7A Destination Cycles in Vance 1E MOA with 24 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.046107
N ₂ O	0.008995

Pollutant	Emissions Per Year (TONs)
CO ₂	1096.511351
CO ₂ e	1100.345019

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	116
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10. Aircraft

10.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Remove

- **Activity Location**

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MTR Destination Cycles (IR-145)

- **Activity Description:**

In 2032, remove 36 T-38C Destination Cycles in IR-145 with 63 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005203
N ₂ O	-0.001015

Pollutant	Emissions Per Year (TONs)
CO ₂	-123.742480
CO ₂ e	-124.175114

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005203
N ₂ O	-0.001015

Pollutant	Emissions Per Year (TONs)
CO ₂	-123.742480
CO ₂ e	-124.175114

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64

Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	36
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2032, remove 29 T-38C Destination Cycles in IR-171 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000

CO	0.000000
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NH ₃	0.000000
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- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003758
N ₂ O	-0.000733

Pollutant	Emissions Per Year (TONs)
CO ₂	-89.369569
CO ₂ e	-89.682027

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003758
N ₂ O	-0.000733

Pollutant	Emissions Per Year (TONs)
CO ₂	-89.369569
CO ₂ e	-89.682027

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations		
Number of Aircraft:		63
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		29
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)

60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2032, remove 21 T-38C Destination Cycles in IR-175 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 21
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

12.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2032, remove 149 T-38C Destination Cycles in IR-181 with 63 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019308
N ₂ O	-0.003767

Pollutant	Emissions Per Year (TONs)
CO ₂	-459.174683
CO ₂ e	-460.780068

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000

CO	0.000000
----	----------

NH ₃	0.000000
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- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019308
N ₂ O	-0.003767

Pollutant	Emissions Per Year (TONs)
CO ₂	-459.174683
CO ₂ e	-460.780068

13.2 Aircraft & Engines

13.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

13.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 149
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0

Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

A_{EFOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2032, remove 21 T-38C Destination Cycles in IR-185 with 63 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.003245
N ₂ O	-0.000633

Pollutant	Emissions Per Year (TONs)
CO ₂	-77.161259
CO ₂ e	-77.431034

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

14.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 21
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Add T-38C MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2032, add 1,216 T-38C Destination Cycles in Vance 1A MOA with 63 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2032

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.066673
N ₂ O	0.013008

Pollutant	Emissions Per Year (TONs)
CO ₂	1585.615666
CO ₂ e	1591.159362

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.066673
N ₂ O	0.013008

Pollutant	Emissions Per Year (TONs)
CO ₂	1585.615666
CO ₂ e	1591.159362

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

15.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gases Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 1216
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3
Climb Out [Intermediate] (mins): 3.6
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0

Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2032, remove 657 T-38C Destination Cycles in Vance 1C MOA with 63 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.061537
N ₂ O	-0.012006

Pollutant	Emissions Per Year (TONs)
CO ₂	-1463.473984
CO ₂ e	-1468.590642

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.061537
N ₂ O	-0.012006

Pollutant	Emissions Per Year (TONs)
CO ₂	-1463.473984
CO ₂ e	-1468.590642

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

16.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 63

Flight Operation Cycle Type: DC (Destination Cycle)

Number of Annual Flight Operation Cycles for all Aircraft: 657

Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.04
Climb Out [Intermediate] (mins): 31.92
Takeoff [Military] (mins): 3.04
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2032: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- **Activity Description:**

In 2032, remove 90 T-38C Destination Cycles in Vance 1E MOA with 63 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2032

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015699
N ₂ O	-0.003063

Pollutant	Emissions Per Year (TONs)
CO ₂	-373.360932
CO ₂ e	-374.666292

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.015699
N ₂ O	-0.003063

Pollutant	Emissions Per Year (TONs)
CO ₂	-373.360932
CO ₂ e	-374.666292

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	63
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	90
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2033, add 229 T-7A Destination Cycles in IR-145 with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.075417
N ₂ O	0.014714

Pollutant	Emissions Per Year (TONs)
CO ₂	1793.579281
CO ₂ e	1799.850067

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.075417
N ₂ O	0.014714

Pollutant	Emissions Per Year (TONs)
CO ₂	1793.579281
CO ₂ e	1799.850067

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	72
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	229
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Destination Cycles (IR-171)

- Activity Description:

In 2033, add 120 T-7A Destination Cycles in IR-171 with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.035432
N ₂ O	0.006913

Pollutant	Emissions Per Year (TONs)
CO ₂	842.639264
CO ₂ e	845.585335

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.035432
N ₂ O	0.006913

Pollutant	Emissions Per Year (TONs)
CO ₂	842.639264
CO ₂ e	845.585335

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 72
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 120
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2033, add 136 T-7A Destination Cycles in IR-175 with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.047878
N ₂ O	0.009341

Pollutant	Emissions Per Year (TONs)
CO ₂	1138.643314
CO ₂ e	1142.624286

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.047878
N ₂ O	0.009341

Pollutant	Emissions Per Year (TONs)
CO ₂	1138.643314
CO ₂ e	1142.624286

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 72
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 136
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)

60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2033, add 125 T-7A Destination Cycles in IR-181 with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.036908
N ₂ O	0.007201

Pollutant	Emissions Per Year (TONs)
CO ₂	877.749234
CO ₂ e	880.818057

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.036908
N ₂ O	0.007201

Pollutant	Emissions Per Year (TONs)
CO ₂	877.749234
CO ₂ e	880.818057

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	72
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	125
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

22. Aircraft

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2033, add 175 T-7A Destination Cycles in IR-185 with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.061608
N ₂ O	0.012020

Pollutant	Emissions Per Year (TONs)
CO ₂	1465.166029
CO ₂ e	1470.288603

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.061608
N ₂ O	0.012020

Pollutant	Emissions Per Year (TONs)
CO ₂	1465.166029
CO ₂ e	1470.288603

22.2 Aircraft & Engines

22.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

22.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

22.3 Flight Operations

22.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 72
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 175
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

22.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

23. Aircraft

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2033, add 3,377 T-7A Destination Cycles in Vance 1A MOA with 72 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2033

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.434785
N ₂ O	0.084827

Pollutant	Emissions Per Year (TONs)
CO ₂	10340.076894
CO ₂ e	10376.228301

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.434785
N ₂ O	0.084827

Pollutant	Emissions Per Year (TONs)
CO ₂	10340.076894
CO ₂ e	10376.228301

23.2 Aircraft & Engines

23.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

23.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

23.3 Flight Operations

23.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 72
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 3377
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.6
Climb Out [Intermediate] (mins): 3
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

23.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)

60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

24. Aircraft

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2033, add 4,342 T-7A Destination Cycles in Vance 1C MOA with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.630952
N ₂ O	0.123099

Pollutant	Emissions Per Year (TONs)
CO ₂	15005.318011
CO ₂ e	15057.780228

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.630952
N ₂ O	0.123099

Pollutant	Emissions Per Year (TONs)
CO ₂	15005.318011
CO ₂ e	15057.780228

24.2 Aircraft & Engines

24.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

24.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

24.3 Flight Operations

24.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	72
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	4342
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	31.92
Climb Out [Intermediate] (mins):	3.04
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

24.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

25. Aircraft

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2033, add 578 T-7A Destination Cycles in Vance 1E MOA with 72 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.229739
N ₂ O	0.044822

Pollutant	Emissions Per Year (TONs)
CO ₂	5463.651385
CO ₂ e	5482.753630

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.229739
N ₂ O	0.044822

Pollutant	Emissions Per Year (TONs)
CO ₂	5463.651385
CO ₂ e	5482.753630

25.2 Aircraft & Engines

25.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

25.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

25.3 Flight Operations

25.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 72
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 578
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

25.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

26. Aircraft

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2033, remove 207 T-38C Destination Cycles in IR-145 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.029918
N ₂ O	-0.005837

Pollutant	Emissions Per Year (TONs)
CO ₂	-711.519262
CO ₂ e	-714.006905

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.029918
N ₂ O	-0.005837

Pollutant	Emissions Per Year (TONs)
CO ₂	-711.519262
CO ₂ e	-714.006905

26.2 Aircraft & Engines

26.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

26.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

26.3 Flight Operations

26.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 207
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

26.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

27. Aircraft

27.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Remove

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Destination Cycles (IR-171)

- **Activity Description:**

In 2033, remove 109 T-38C Destination Cycles in IR-171 with 14 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2033

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.014124
N ₂ O	-0.002756

Pollutant	Emissions Per Year (TONs)
CO ₂	-335.906312
CO ₂ e	-337.080721

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.014124
N ₂ O	-0.002756

Pollutant	Emissions Per Year (TONs)
CO ₂	-335.906312
CO ₂ e	-337.080721

27.2 Aircraft & Engines

27.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer

Aircraft has After burn: Yes
Number of Engines: 2

- **Aircraft & Engine Surrogate**
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

27.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

27.3 Flight Operations

27.3.1 Flight Operations Assumptions

- **Flight Operations**
Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 109
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

27.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

28. Aircraft

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2033, remove 123 T-38C Destination Cycles in IR-175 with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019004
N ₂ O	-0.003708

Pollutant	Emissions Per Year (TONs)
CO ₂	-451.944519
CO ₂ e	-453.524626

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.019004
N ₂ O	-0.003708

Pollutant	Emissions Per Year (TONs)
CO ₂	-451.944519
CO ₂ e	-453.524626

28.2 Aircraft & Engines

28.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:
Original Engine Name:

28.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

28.3 Flight Operations

28.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 123
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

28.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AE_{PS_{POL}} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AE_{PS_{POL}}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PS_{IDLE}} + AE_{PS_{APPROACH}} + AE_{PS_{INTERMEDIATE}} + AE_{PS_{MILITARY}} + AE_{PS_{AFTERBURN}}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AE_{PS_{IDLE}}: Aircraft Emissions for Idle Power Setting (TONs)
 AE_{PS_{APPROACH}}: Aircraft Emissions for Approach Power Setting (TONs)
 AE_{PS_{INTERMEDIATE}}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AE_{PS_{MILITARY}}: Aircraft Emissions for Military Power Setting (TONs)
 AE_{PS_{AFTERBURN}}: Aircraft Emissions for After Burner Power Setting (TONs)

29. Aircraft

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK;
 Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Add T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2033, add 13 T-38C Destination Cycles in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001685
N ₂ O	0.000329

Pollutant	Emissions Per Year (TONs)
CO ₂	40.062221
CO ₂ e	40.202288

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.001685
N ₂ O	0.000329

Pollutant	Emissions Per Year (TONs)
CO ₂	40.062221
CO ₂ e	40.202288

29.2 Aircraft & Engines

29.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

29.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

29.3 Flight Operations

29.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	13
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

29.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

30. Aircraft

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2033, remove 158 T-38C Destination Cycles in IR-185 with 14 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.024411
N ₂ O	-0.004763

Pollutant	Emissions Per Year (TONs)
CO ₂	-580.546617
CO ₂ e	-582.576349

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.024411
N ₂ O	-0.004763

Pollutant	Emissions Per Year (TONs)
CO ₂	-580.546617
CO ₂ e	-582.576349

30.2 Aircraft & Engines

30.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

30.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

30.3 Flight Operations

30.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	158
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

30.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

31. Aircraft

31.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2033, remove 3,058 T-38C Destination Cycles in Vance 1A MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.167669
N ₂ O	-0.032712

Pollutant	Emissions Per Year (TONs)
CO ₂	-3987.510451
CO ₂ e	-4001.451750

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.167669
N ₂ O	-0.032712

Pollutant	Emissions Per Year (TONs)
CO ₂	-3987.510451
CO ₂ e	-4001.451750

31.2 Aircraft & Engines

31.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

31.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

31.3 Flight Operations

31.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		14
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		3058
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3
Climb Out [Intermediate] (mins):	3.6
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

31.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

32. Aircraft

32.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2033: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2033, remove 4,776 T-38C Destination Cycles in Vance 1C MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.447337
N ₂ O	-0.087276

Pollutant	Emissions Per Year (TONs)
CO ₂	-10638.587131
CO ₂ e	-10675.782202

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.447337
N ₂ O	-0.087276

Pollutant	Emissions Per Year (TONs)
CO ₂	-10638.587131
CO ₂ e	-10675.782202

32.2 Aircraft & Engines

32.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

32.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

32.3 Flight Operations

32.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	4776
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.04
Climb Out [Intermediate] (mins):	31.92
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

32.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

33. Aircraft

33.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2033: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2033, remove 524 T-38C Destination Cycles in Vance 1E MOA with 14 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2033

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091405
N ₂ O	-0.017833

Pollutant	Emissions Per Year (TONs)
CO ₂	-2173.790315
CO ₂ e	-2181.390411

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

Pollutant	Emissions Per Year (TONs)
-----------	---------------------------

VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.091405
N ₂ O	-0.017833

Pollutant	Emissions Per Year (TONs)
CO ₂	-2173.790315
CO ₂ e	-2181.390411

33.2 Aircraft & Engines

33.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

33.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

33.3 Flight Operations

33.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 524
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

33.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

34. Aircraft

34.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2034, add 206 T-7A Destination Cycles in IR-145 with 99 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.067843
N ₂ O	0.013236

Pollutant	Emissions Per Year (TONs)
CO ₂	1613.438130
CO ₂ e	1619.079100

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.067843
N ₂ O	0.013236

Pollutant	Emissions Per Year (TONs)
CO ₂	1613.438130
CO ₂ e	1619.079100

34.2 Aircraft & Engines

34.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

34.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

34.3 Flight Operations

34.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 206
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 29
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

34.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

35. Aircraft

35.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-171)

- Activity Description:

In 2034, add 108 T-7A Destination Cycles in IR-171 with 99 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.031889
N ₂ O	0.006221

Pollutant	Emissions Per Year (TONs)
CO ₂	758.375338
CO ₂ e	761.026801

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.031889
N ₂ O	0.006221

Pollutant	Emissions Per Year (TONs)
CO ₂	758.375338
CO ₂ e	761.026801

35.2 Aircraft & Engines

35.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:
Original Engine Name:

35.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

35.3 Flight Operations

35.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		99
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		108
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

35.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

36. Aircraft

36.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2034, add 123 T-7A Destination Cycles in IR-175 with 99 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043302
N ₂ O	0.008448

Pollutant	Emissions Per Year (TONs)
CO ₂	1029.802409
CO ₂ e	1033.402847

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043302
N ₂ O	0.008448

Pollutant	Emissions Per Year (TONs)
CO ₂	1029.802409
CO ₂ e	1033.402847

36.2 Aircraft & Engines

36.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

36.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

36.3 Flight Operations

36.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 123
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

36.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

37. Aircraft

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-181)

- Activity Description:

In 2034, add 113 T-7A Destination Cycles in IR-181 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.033365
N ₂ O	0.006510

Pollutant	Emissions Per Year (TONs)
CO ₂	793.485307
CO ₂ e	796.259524

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH ₄	0.033365	CO ₂	793.485307
N ₂ O	0.006510	CO ₂ e	796.259524

37.2 Aircraft & Engines

37.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

37.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

37.3 Flight Operations

37.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 113
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0

AfterBurn (mins): 0

37.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

38. Aircraft

38.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2034, add 157 T-7A Destination Cycles in IR-185 with 99 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.055271
N ₂ O	0.010783

Pollutant	Emissions Per Year (TONs)
CO ₂	1314.463237
CO ₂ e	1319.058918

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.055271
N ₂ O	0.010783

Pollutant	Emissions Per Year (TONs)
CO ₂	1314.463237
CO ₂ e	1319.058918

38.2 Aircraft & Engines

38.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate
 - Is Aircraft & Engine a Surrogate? No
 - Original Aircraft Name:
 - Original Engine Name:

38.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)
 - Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

38.3 Flight Operations

38.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft: 99
 - Flight Operation Cycle Type: DC (Destination Cycle)
 - Number of Annual Flight Operation Cycles for all Aircraft: 157
 - Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi [Idle] (mins): 0
 - Approach [Approach] (mins): 0
 - Climb Out [Intermediate] (mins): 0
 - Takeoff [Military] (mins): 31
 - Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins): 0
 - Approach (mins): 0
 - Intermediate (mins): 0
 - Military (mins): 0
 - AfterBurn (mins): 0

38.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

39. Aircraft

39.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2034, add 3,039 T-7A Destination Cycles in Vance 1A MOA with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.391268
N ₂ O	0.076336

Pollutant	Emissions Per Year (TONs)
CO ₂	9305.150631
CO ₂ e	9337.683685

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.391268
N ₂ O	0.076336

Pollutant	Emissions Per Year (TONs)
CO ₂	9305.150631
CO ₂ e	9337.683685

39.2 Aircraft & Engines

39.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

39.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

39.3 Flight Operations

39.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 3039
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	3.6
Climb Out [Intermediate] (mins):	3
Takeoff [Military] (mins):	8.4
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

39.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

40. Aircraft

40.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2034, add 3,908 T-7A Destination Cycles in Vance 1C MOA with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.567886
N ₂ O	0.110795

Pollutant	Emissions Per Year (TONs)
CO ₂	13505.477381
CO ₂ e	13552.695792

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000

CO	0.000000
----	----------

NH ₃	0.000000
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- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.567886
N ₂ O	0.110795

Pollutant	Emissions Per Year (TONs)
CO ₂	13505.477381
CO ₂ e	13552.695792

40.2 Aircraft & Engines

40.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

40.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

40.3 Flight Operations

40.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 3908
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 31.92
Climb Out [Intermediate] (mins): 3.04
Takeoff [Military] (mins): 3.04
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0

Military (mins): 0
AfterBurn (mins): 0

40.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

41. Aircraft

41.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2034, add 520 T-7A Destination Cycles in Vance 1E MOA with 99 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.206685
N ₂ O	0.040324

Pollutant	Emissions Per Year (TONs)
CO ₂	4915.395709
CO ₂ e	4932.581120

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.206685
N ₂ O	0.040324

Pollutant	Emissions Per Year (TONs)
CO ₂	4915.395709
CO ₂ e	4932.581120

41.2 Aircraft & Engines

41.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A

Engine Model: F404-GE-102

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

41.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

41.3 Flight Operations

41.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	520
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

41.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

42. Aircraft

42.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-145)

- Activity Description:

In 2034, remove 80 T-38C Destination Cycles in IR-145 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011563
N ₂ O	-0.002256

Pollutant	Emissions Per Year (TONs)
CO ₂	-274.983290
CO ₂ e	-275.944698

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.011563
N ₂ O	-0.002256

Pollutant	Emissions Per Year (TONs)
CO ₂	-274.983290
CO ₂ e	-275.944698

42.2 Aircraft & Engines

42.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
 Engine Model: J85-GE-5R
 Primary Function: Trainer
 Aircraft has After burn: Yes
 Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
 Original Aircraft Name:
 Original Engine Name:

42.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64

Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

42.3 Flight Operations

42.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	80
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

42.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

43. Aircraft

43.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MTR Destination Cycles (IR-171)

- Activity Description:

In 2034, remove 42 T-38C Destination Cycles in IR-171 with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000

NO _x	0.000000
CO	0.000000

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005442
N ₂ O	-0.001062

Pollutant	Emissions Per Year (TONs)
CO ₂	-129.431790
CO ₂ e	-129.884315

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005442
N ₂ O	-0.001062

Pollutant	Emissions Per Year (TONs)
CO ₂	-129.431790
CO ₂ e	-129.884315

43.2 Aircraft & Engines

43.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

43.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

43.3 Flight Operations

43.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	42
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

43.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

44. Aircraft

44.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MTR Destination Cycles (IR-175)

- Activity Description:

In 2034, remove 48 T-38C Destination Cycles in IR-175 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007416

Pollutant	Emissions Per Year (TONs)
CO ₂	-176.368593

N ₂ O	-0.001447
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CO ₂ e	-176.985220
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- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.007416
N ₂ O	-0.001447

Pollutant	Emissions Per Year (TONs)
CO ₂	-176.368593
CO ₂ e	-176.985220

44.2 Aircraft & Engines

44.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

44.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

44.3 Flight Operations

44.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 48

Number of Annual Trim Test(s) per Aircraft:

0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	31
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

44.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

45. Aircraft

45.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-181)

- Activity Description:

In 2034, remove 44 T-38C Destination Cycles in IR-181 with 49 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2034

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005702
N ₂ O	-0.001112

Pollutant	Emissions Per Year (TONs)
CO ₂	-135.595208
CO ₂ e	-136.069282

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000

NO _x	0.000000
CO	0.000000

Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.005702
N ₂ O	-0.001112

Pollutant	Emissions Per Year (TONs)
CO ₂	-135.595208
CO ₂ e	-136.069282

45.2 Aircraft & Engines

45.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

45.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

45.3 Flight Operations

45.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 44
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0

Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

45.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

46. Aircraft

46.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MTR Destination Cycles (IR-185)

- Activity Description:

In 2034, remove 61 T-38C Destination Cycles in IR-185 with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.009425
N ₂ O	-0.001839

Pollutant	Emissions Per Year (TONs)
CO ₂	-224.135086
CO _{2e}	-224.918717

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.009425

Pollutant	Emissions Per Year (TONs)
CO ₂	-224.135086

N ₂ O	-0.001839
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CO ₂ e	-224.918717
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46.2 Aircraft & Engines

46.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

46.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gases Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

46.3 Flight Operations

46.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 61
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

46.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

47. Aircraft

47.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Destination Cycles (Vance 1A MOA)

- Activity Description:

In 2034, remove 1,182 T-38C Destination Cycles in Vance 1A MOA with 49 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2034

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.064809
N ₂ O	-0.012644

Pollutant	Emissions Per Year (TONs)
CO ₂	-1541.281018
CO ₂ e	-1546.669709

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.064809
N ₂ O	-0.012644

Pollutant	Emissions Per Year (TONs)
CO ₂	-1541.281018
CO ₂ e	-1546.669709

47.2 Aircraft & Engines

47.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C
Engine Model: J85-GE-5R
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

47.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gases Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH₄	N₂O	CO₂	CO₂e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

47.3 Flight Operations

47.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 1182
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3
Climb Out [Intermediate] (mins): 3.6
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0

Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

47.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

48. Aircraft

48.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2034: Remove T-38C MOA Destination Cycles (Vance 1C MOA)

- Activity Description:

In 2034, remove 675 T-38C Destination Cycles in Vance 1C MOA with 49 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2034

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.063223
N ₂ O	-0.012335

Pollutant	Emissions Per Year (TONs)
CO ₂	-1503.569161
CO ₂ e	-1508.826002

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.063223
N ₂ O	-0.012335

Pollutant	Emissions Per Year (TONs)
CO ₂	-1503.569161
CO ₂ e	-1508.826002

48.2 Aircraft & Engines

48.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

48.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

48.3 Flight Operations

48.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 49

Flight Operation Cycle Type: DC (Destination Cycle)

Number of Annual Flight Operation Cycles for all Aircraft: 675

Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
 Approach [Approach] (mins): 3.04
 Climb Out [Intermediate] (mins): 31.92
 Takeoff [Military] (mins): 3.04
 Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
 Approach (mins): 0
 Intermediate (mins): 0
 Military (mins): 0
 AfterBurn (mins): 0

48.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

49. Aircraft

49.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2034: Remove T-38C MOA Destination Cycles (Vance 1E MOA)

- **Activity Description:**

In 2034, remove 202 T-38C Destination Cycles in Vance 1E MOA with 49 aircraft.

- **Activity Start Date**

Start Month: 1

Start Year: 2034

- **Activity End Date**

Indefinite: Yes

End Month: N/A

End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035236
N ₂ O	-0.006875

Pollutant	Emissions Per Year (TONs)
CO ₂	-837.987870
CO ₂ e	-840.917678

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	-0.035236
N ₂ O	-0.006875

Pollutant	Emissions Per Year (TONs)
CO ₂	-837.987870
CO ₂ e	-840.917678

49.2 Aircraft & Engines

49.2.1 Aircraft & Engines Assumptions

- **Aircraft & Engine**

Aircraft Designation: T-38C

Engine Model: J85-GE-5R

Primary Function: Trainer

Aircraft has After burn: Yes

Number of Engines: 2

- **Aircraft & Engine Surrogate**

Is Aircraft & Engine a Surrogate? No

Original Aircraft Name:

Original Engine Name:

49.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.23
Approach	689.00	7.96	1.07	0.84	119.23	2.42	2.17
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	1.61
Military	2220.00	0.75	1.07	1.92	30.99	1.13	1.01
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.23

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

	Fuel Flow	CH ₄	N ₂ O	CO ₂	CO ₂ e
Idle	520.00	0.13	0.03	3203.44	3214.64
Approach	689.00	0.13	0.03	3203.44	3214.64
Intermediate	1030.00	0.13	0.03	3203.44	3214.64
Military	2220.00	0.13	0.03	3203.44	3214.64
After Burn	7695.00	0.13	0.03	3203.44	3214.64

49.3 Flight Operations

49.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	49
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	202
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	35
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

49.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

50. Aircraft

50.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Garfield, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2035: Add T-7A MTR Destination Cycles (IR-145)

- Activity Description:

In 2035, add 23 T-7A Destination Cycles in IR-145 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007575
N ₂ O	0.001478

Pollutant	Emissions Per Year (TONs)
CO ₂	180.141150
CO ₂ e	180.770967

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.007575
N ₂ O	0.001478

Pollutant	Emissions Per Year (TONs)
CO ₂	180.141150
CO ₂ e	180.770967

50.2 Aircraft & Engines

50.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

50.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

50.3 Flight Operations

50.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	23
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	29
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

50.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

51. Aircraft

51.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2035: Add T-7A MTR Destination Cycles (IR-171)

- **Activity Description:**

In 2035, add 12 T-7A Destination Cycles in IR-171 with 99 aircraft.

- **Activity Start Date**

Start Month: 1
Start Year: 2035

- **Activity End Date**

Indefinite: Yes
End Month: N/A
End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003543
N ₂ O	0.000691

Pollutant	Emissions Per Year (TONs)
CO ₂	84.263926
CO ₂ e	84.558533

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003543
N ₂ O	0.000691

Pollutant	Emissions Per Year (TONs)
CO ₂	84.263926
CO ₂ e	84.558533

51.2 Aircraft & Engines

51.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

51.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

51.3 Flight Operations

51.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 12
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 26
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

51.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

52. Aircraft

52.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK, Woodward, OK; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035: Add T-7A MTR Destination Cycles (IR-175)

- Activity Description:

In 2035, add 14 T-7A Destination Cycles in IR-175 with 99 aircraft.

- Activity Start Date

Start Month: 1

Start Year: 2035

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004929
N ₂ O	0.000962

Pollutant	Emissions Per Year (TONs)
CO ₂	117.213282
CO ₂ e	117.623088

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.004929
N ₂ O	0.000962

Pollutant	Emissions Per Year (TONs)
CO ₂	117.213282
CO ₂ e	117.623088

52.2 Aircraft & Engines

52.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

52.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

52.3 Flight Operations

52.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 14
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

52.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)

60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

53. Aircraft

53.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Alfalfa, OK; Blaine, OK; Custer, OK; Dewey, OK; Ellis, OK; OK; Kingfisher, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK; Hemphill, TX; Lipscomb, TX

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2035: Add T-7A MTR Destination Cycles (IR-181)

- **Activity Description:**

In 2035, add 13 T-7A Destination Cycles in IR-181 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003838
N ₂ O	0.000749

Pollutant	Emissions Per Year (TONs)
CO ₂	91.285920
CO ₂ e	91.605078

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.003838
N ₂ O	0.000749

Pollutant	Emissions Per Year (TONs)
CO ₂	91.285920
CO ₂ e	91.605078

53.2 Aircraft & Engines

53.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

53.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

53.3 Flight Operations

53.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	99
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	13
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	0
Takeoff [Military] (mins):	26
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

53.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

54. Aircraft

54.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Alfalfa, OK; Beaver, OK; Ellis, OK; Harper, OK; Major, OK; Woods, OK; Woodward, OK; Lipscomb, TX
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035: Add T-7A MTR Destination Cycles (IR-185)

- Activity Description:

In 2035, add 17 T-7A Destination Cycles in IR-185 with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005985
N ₂ O	0.001168

Pollutant	Emissions Per Year (TONs)
CO ₂	142.330414
CO ₂ e	142.828036

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.005985
N ₂ O	0.001168

Pollutant	Emissions Per Year (TONs)
CO ₂	142.330414
CO ₂ e	142.828036

54.2 Aircraft & Engines

54.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

54.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

54.3 Flight Operations

54.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 17
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 31

Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

54.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 FOC: Number of Flight Operation Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

55. Aircraft

55.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- **Activity Location**

County(s): Alfalfa, OK; Blaine, OK; Dewey, OK; Garfield, OK; Kingfisher, OK; Major, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2035: Add T-7A MOA Destination Cycles (Vance 1A MOA)

- **Activity Description:**

In 2035, add 338 T-7A Destination Cycles in Vance 1A MOA with 99 aircraft.

- **Activity Start Date**

Start Month: 1
 Start Year: 2035

- **Activity End Date**

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- **Activity Emissions of Criteria Pollutants:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043517
N ₂ O	0.008490

Pollutant	Emissions Per Year (TONs)
CO ₂	1034.926263
CO ₂ e	1038.544615

- **Activity Emissions of Criteria Pollutants [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- **Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:**

Pollutant	Emissions Per Year (TONs)
CH ₄	0.043517
N ₂ O	0.008490

Pollutant	Emissions Per Year (TONs)
CO ₂	1034.926263
CO ₂ e	1038.544615

55.2 Aircraft & Engines

55.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

55.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

55.3 Flight Operations

55.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 338
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 3.6
Climb Out [Intermediate] (mins): 3
Takeoff [Military] (mins): 8.4
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

55.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)

60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

56. Aircraft

56.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Clark, KS; Comanche, KS; Dewey, OK; Ellis, OK; Harper, OK; Major, OK; Roger Mills, OK; Woods, OK; Woodward, OK

Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2035: Add T-7A MOA Destination Cycles (Vance 1C MOA)

- **Activity Description:**

In 2035, add 434 T-7A Destination Cycles in Vance 1C MOA with 99 aircraft.

- Activity Start Date

Start Month: 1
Start Year: 2035

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.063066
N ₂ O	0.012304

Pollutant	Emissions Per Year (TONs)
CO ₂	1499.840630
CO ₂ e	1505.084435

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.063066
N ₂ O	0.012304

Pollutant	Emissions Per Year (TONs)
CO ₂	1499.840630
CO ₂ e	1505.084435

56.2 Aircraft & Engines

56.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

56.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

56.3 Flight Operations

56.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		99
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		434
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	31.92
Climb Out [Intermediate] (mins):	3.04
Takeoff [Military] (mins):	3.04
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

56.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

57. Aircraft

57.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County(s): Barber, KS; Harper, KS; Alfalfa, OK; Woods, OK
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2035: Add T-7A MOA Destination Cycles (Vance 1E MOA)

- Activity Description:

In 2035, add 58 T-7A Destination Cycles in Vance 1E MOA with 99 aircraft.

- Activity Start Date

Start Month: 1
 Start Year: 2035

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.023053
N ₂ O	0.004498

Pollutant	Emissions Per Year (TONs)
CO ₂	548.255675
CO ₂ e	550.172510

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO _x	0.000000
NO _x	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 10	0.000000
PM 2.5	0.000000
Pb	0.000000
NH ₃	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)
CH ₄	0.023053
N ₂ O	0.004498

Pollutant	Emissions Per Year (TONs)
CO ₂	548.255675
CO ₂ e	550.172510

57.2 Aircraft & Engines

57.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-7A
Engine Model: F404-GE-102
Primary Function: Trainer
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

57.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

57.3 Flight Operations

57.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 99
Flight Operation Cycle Type: DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft: 58
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 0
Takeoff [Military] (mins): 35
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

57.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)