

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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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56.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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56.4.3 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

E-3 AIRSPACE ROI 1 (Brady MOA)

Counties in the ACAM analysis for Airspace ROI 1 (Brady MOA) include McCulloch, San Saba, and Llano. The content of Section E-3 presents the data and methodology used for preparing aircraft operations data for the ACAM modeling followed by the ACAM results.

This section includes the following:

- Proposed Action ACAM Report
- Proposed Action ACAM Detailed Report
- Alternative 1 ACAM Report
- Alternative 1 ACAM Detailed Report
- Alternative 2 ACAM Report
- Alternative 2 ACAM Detailed Report
- Alternative 3 ACAM Report
- Alternative 3 ACAM Detailed Report

PROPOSED ACTION 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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB
State: Texas
County(s): McCulloch; San Saba; Llano; McMullen
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Proposed Action (Brady MOA)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment. As provided by the noise data, aircraft will fly 2,920 annual low flight patterns in the steady state year within this MOA, and spend 10 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

f. Point of Contact:

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

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

applicable
 not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.100	250	No
NOx	1.114	250	No
CO	-1.189	250	No
SOx	0.052	250	No
PM 10	-0.027	250	No
PM 2.5	-0.006	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	156.9		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	0.275	250	No
NO _x	3.067	250	No
CO	-3.276	250	No
SO _x	0.143	250	No
PM 10	-0.075	250	No
PM 2.5	-0.018	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	432.2		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.649	250	No
NO _x	7.315	250	No
CO	-7.673	250	No
SO _x	0.350	250	No
PM 10	-0.178	250	No
PM 2.5	-0.042	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	1060.8		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.004	250	No
NO _x	11.270	250	No
CO	-11.896	250	No
SO _x	0.534	250	No
PM 10	-0.275	250	No
PM 2.5	-0.064	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	1617.9		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.652	250	No
NO _x	18.509	250	No
CO	-19.628	250	No
SO _x	0.872	250	No
PM 10	-0.452	250	No
PM 2.5	-0.106	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	2637.8		

2028

Pollutant		INSIGNIFICANCE INDICATOR	
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	Action Emissions (ton/yr)	Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.220	250	No
NO _x	24.948	250	No
CO	-26.292	250	No
SO _x	1.186	250	No
PM 10	-0.607	250	No
PM 2.5	-0.143	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3590.8		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.287	250	No
NO _x	25.694	250	No
CO	-27.089	250	No
SO _x	1.221	250	No
PM 10	-0.626	250	No
PM 2.5	-0.147	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3695.8		

2030

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.321	250	No
NO _x	26.088	250	No
CO	-27.496	250	No
SO _x	1.240	250	No
PM 10	-0.635	250	No
PM 2.5	-0.149	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3754.1		

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.308	250	No
NO _x	25.937	250	No
CO	-27.335	250	No
SO _x	1.233	250	No
PM 10	-0.631	250	No
PM 2.5	-0.148	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3732.8		

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.472	250	No
NO _x	27.768	250	No
CO	-29.291	250	No
SO _x	1.318	250	No
PM 10	-0.676	250	No
PM 2.5	-0.159	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO _{2e}	3990.8		

2033 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.472	250	No
NO _x	27.768	250	No
CO	-29.291	250	No
SO _x	1.318	250	No
PM 10	-0.676	250	No
PM 2.5	-0.159	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO _{2e}	3990.8		

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

PROPOSED ACTION

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: RANDOLPH AFB
State: Texas
County(s): McCulloch; San Saba; Llano; McMullen
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Proposed Action (Brady MOA)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2023

- Action Purpose and Need:

The T 38 Talon is a twin-engine, high-altitude, supersonic jet used by the USAF and other nations for pilot training. The aircraft originally was developed in the 1950s with production occurring between 1961 and 1972. The fleet has undergone periodic upgrades overtime. In 2001, the USAF upgraded several hundred T 38s with modern avionics and replaced propulsion components to provide increased performance and superior reliability.

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NOx) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment. As provided by the noise data, aircraft will fly 2,920 annual low flight patterns in the steady state year within this MOA, and spend 10

minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2023 Additon of 118 T-7 LFP
3.	Aircraft	2023 Removal 118 T-38 LFP
4.	Aircraft	2024 Addition 207 LFP
5.	Aircraft	2024 Removal 207 T-38 LFP
6.	Aircraft	2025 Addition 442 T-7 LFP
7.	Aircraft	2025 Removal 442 T-38 LFP
8.	Aircraft	2026 Addition 419 T-7 LFP
9.	Aircraft	2026 Removal 419 T-38 LFP
10.	Aircraft	2027 Addition 767 T-7 LFP
11.	Aircraft	2027 Removal 767 T-38 LFP
12.	Aircraft	2028 Addition 670 T-7 LFP
13.	Aircraft	2028 Removal 670 T-38 LFP
14.	Aircraft	2029 Addition 79 T-7 LFP
15.	Aircraft	2029 Remove 79 T-38 LFP
16.	Aircraft	2030 Addition 41 T-7 LFP
17.	Aircraft	2030 Removal 41 T-38 LFP
18.	Aircraft	2031 Removal 16 T-7A LFP
19.	Aircraft	2031 addition 16 T-38 LFP
20.	Aircraft	2032 Addition 194 T-7 LFP
21.	Aircraft	2032 Removal 194 T-38 LFP

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: McCulloch; San Saba; Llano
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Additon of 118 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.156118
SO _x	0.073589
NO _x	1.127899
CO	0.128608
PM 10	0.008941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.007565
Pb	0.000000
NH ₃	0.000000
CO _{2e}	222.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.156118
SO _x	0.073589
NO _x	1.127899
CO	0.128608
PM 10	0.008941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.007565
Pb	0.000000
NH ₃	0.000000
CO _{2e}	222.4

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 Emissions 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: 8
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 118
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

2.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2023 Removal 118 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2023
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.056314
SO _x	-0.021675
NO _x	-0.014180
CO	-1.318101
PM 10	-0.036259

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.013977
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-65.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.056314
SO _x	-0.021675
NO _x	-0.014180
CO	-1.318101
PM 10	-0.036259

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.013977
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-65.5

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 10
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 118
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PSIDLE} + AE_{PSAPPROACH} + AE_{PSINTERMEDIATE} + AE_{PSMILITARY} + AE_{PSAFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AE_{PSIDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AE_{PSAPPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AE_{PSINTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AE_{PSMILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AE_{PSAFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

- County: Llano; San Saba; McCulloch
- Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Addition 207 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2024

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.273868
SO _x	0.129092
NO _x	1.978603
CO	0.225609
PM 10	0.015684

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.013271
Pb	0.000000
NH ₃	0.000000
CO _{2e}	390.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.273868
SO _x	0.129092
NO _x	1.978603
CO	0.225609
PM 10	0.015684

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.013271
Pb	0.000000
NH ₃	0.000000
CO _{2e}	390.2

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 Emissions 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: 10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 207

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

4.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Removal 207 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2024

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.098787
SO _x	-0.038022
NO _x	-0.024875
CO	-2.312262
PM 10	-0.063608

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.024519
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-114.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.098787
SO _x	-0.038022
NO _x	-0.024875
CO	-2.312262
PM 10	-0.063608

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.024519
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-114.9

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 11
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 207
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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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5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 442 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2025

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.585332
SO _x	0.288353
NO _x	4.301087
CO	0.540853
PM 10	0.033490

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.028337
Pb	0.000000
NH ₃	0.000000
CO _{2e}	874.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.585332
SO _x	0.288353
NO _x	4.301087
CO	0.540853
PM 10	0.033490

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.028337
Pb	0.000000
NH ₃	0.000000
CO _{2e}	874.0

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 Emissions 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:	7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	442
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Removal 442 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2025

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.210937
SO _x	-0.081188
NO _x	-0.053114
CO	-4.937295
PM 10	-0.135819

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.052355
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-245.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.210937
SO _x	-0.081188
NO _x	-0.053114

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.052355
Pb	0.000000
NH ₃	0.000000

CO	-4.937295
PM 10	-0.135819

CO _{2e}	-245.4

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 7
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 442
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12

Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)

- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Addition 419 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.554350
SO _x	0.261302
NO _x	4.004998
CO	0.456667
PM 10	0.031747

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.026863
Pb	0.000000
NH ₃	0.000000
CO _{2e}	789.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.554350
SO _x	0.261302
NO _x	4.004998
CO	0.456667
PM 10	0.031747

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.026863
Pb	0.000000
NH ₃	0.000000
CO _{2e}	789.8

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 Emissions 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:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	419
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 419 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.199961
SO _x	-0.076963
NO _x	-0.050350
CO	-4.680377
PM 10	-0.128752

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.049631
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-232.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.199961

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.049631

SO _x	-0.076963
NO _x	-0.050350
CO	-4.680377
PM 10	-0.128752

Pb	0.000000
NH ₃	0.000000
CO _{2e}	-232.6

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 16
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 419
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 767 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.014765
SO _x	0.478325
NO _x	7.331344
CO	0.835952
PM 10	0.058114

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.049174
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1445.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.014765
SO _x	0.478325
NO _x	7.331344
CO	0.835952
PM 10	0.058114

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.049174
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1445.7

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	19
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	767
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Removal 767 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.366038
SO _x	-0.140885
NO _x	-0.092168
CO	-8.567658
PM 10	-0.235686

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.090851
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-425.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.366038
SO _x	-0.140885
NO _x	-0.092168
CO	-8.567658
PM 10	-0.235686

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.090851
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-425.8

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 21
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 767
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 670 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2028

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.887269
SO _x	0.437096
NO _x	6.519748
CO	0.819844
PM 10	0.050765

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.042955
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1324.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.887269
SO _x	0.437096
NO _x	6.519748
CO	0.819844
PM 10	0.050765

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.042955
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1324.9

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	670
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 670 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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VOC	-0.319746
SO _x	-0.123068
NO _x	-0.080512
CO	-7.484135
PM 10	-0.205880

PM 2.5	-0.079362
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-372.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.319746
SO _x	-0.123068
NO _x	-0.080512
CO	-7.484135
PM 10	-0.205880

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.079362
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-372.0

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 670
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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
 EFPOL: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2029 Addition 79 T-7 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2029
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.104520
SO _x	0.049267
NO _x	0.755119
CO	0.086102
PM 10	0.005986

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.005065
Pb	0.000000
NH ₃	0.000000
CO _{2e}	148.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.104520
SO _x	0.049267
NO _x	0.755119
CO	0.086102
PM 10	0.005986

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.005065
Pb	0.000000
NH ₃	0.000000
CO _{2e}	148.9

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 Emissions 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:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	79
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14.4 Auxiliary Power Unit (APU)

14.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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14.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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14.4.3 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

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2029 Remove 79 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2029

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.037701
SO _x	-0.014511
NO _x	-0.009493
CO	-0.882458
PM 10	-0.024275

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.009358
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-43.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.037701
SO _x	-0.014511
NO _x	-0.009493
CO	-0.882458
PM 10	-0.024275

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.009358
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-43.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 6
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 79
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15.4 Auxiliary Power Unit (APU)

15.4.1 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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15.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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15.4.3 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

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Addition 41 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2030

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.054296
SO _x	0.026748
NO _x	0.398970
CO	0.050170
PM 10	0.003107

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002629
Pb	0.000000
NH ₃	0.000000
CO _{2e}	81.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.054296
SO _x	0.026748
NO _x	0.398970
CO	0.050170
PM 10	0.003107

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002629
Pb	0.000000
NH ₃	0.000000
CO _{2e}	81.1

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 41
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16.4 Auxiliary Power Unit (APU)

16.4.1 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

16.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

16.4.3 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. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Removal 41 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.019567
SO _x	-0.007531
NO _x	-0.004927
CO	-0.457984
PM 10	-0.012599

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.004856
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-22.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.019567
SO _x	-0.007531
NO _x	-0.004927
CO	-0.457984
PM 10	-0.012599

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.004856
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-22.8

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 41

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

17.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 Removal 16 T-7A LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2031

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.021169
SO _x	-0.009978
NO _x	-0.152935
CO	-0.017438
PM 10	-0.001212

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.001026
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-30.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.021169
SO _x	-0.009978
NO _x	-0.152935
CO	-0.017438
PM 10	-0.001212

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.001026
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-30.2

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 16
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

18.4 Auxiliary Power Unit (APU)

18.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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18.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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18.4.3 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

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McMullen; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 addition 16 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2031

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.007636
SO _x	0.002939
NO _x	0.001923
CO	0.178726
PM 10	0.004917

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.001895
Pb	0.000000
NH ₃	0.000000
CO _{2e}	8.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.007636
SO _x	0.002939
NO _x	0.001923
CO	0.178726
PM 10	0.004917

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.001895
Pb	0.000000
NH ₃	0.000000
CO _{2e}	8.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations	
Number of Aircraft:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	16
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions 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

19.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	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: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Addition 194 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.256668
SO _x	0.120985
NO _x	1.854343
CO	0.211440
PM 10	0.014699

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.012438
Pb	0.000000
NH ₃	0.000000
CO _{2e}	365.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.256668
SO _x	0.120985
NO _x	1.854343
CO	0.211440
PM 10	0.014699

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.012438
Pb	0.000000
NH ₃	0.000000
CO _{2e}	365.7

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 194
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20.4 Auxiliary Power Unit (APU)

20.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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20.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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20.4.3 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. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Removal 194 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.092583
SO _x	-0.035635
NO _x	-0.023312
CO	-2.167048
PM 10	-0.059613

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.022979
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-107.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.092583
SO _x	-0.035635
NO _x	-0.023312
CO	-2.167048
PM 10	-0.059613

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.022979
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-107.7

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	194
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

ALTERNATIVE 1

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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB
State: Texas
County(s): McCulloch; San Saba; Llano
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 1 (Brady MOA)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft’s maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA–Randolph AFB and JBSA–Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment. As provided by the noise data, aircraft will fly 2,920 annual low flight patterns in the steady state year within this MOA, and spend 10 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

f. Point of Contact:

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

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

applicable
 not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.117	250	No
NOx	1.302	250	No
CO	-1.391	250	No
SOx	0.061	250	No
PM 10	-0.032	250	No
PM 2.5	-0.007	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	183.5		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	0.321	250	No
NOx	3.577	250	No
CO	-3.820	250	No
SOx	0.167	250	No
PM 10	-0.088	250	No
PM 2.5	-0.021	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	504.0		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.757	250	No
NOx	8.527	250	No
CO	-8.943	250	No
SOx	0.408	250	No
PM 10	-0.207	250	No
PM 2.5	-0.049	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	1236.4		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.170	250	No
NOx	13.133	250	No
CO	-13.862	250	No
SOx	0.623	250	No
PM 10	-0.320	250	No
PM 2.5	-0.075	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	1885.3		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.773	250	No
NOx	19.862	250	No
CO	-21.050	250	No
SOx	0.936	250	No
PM 10	-0.485	250	No
PM 2.5	-0.114	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	2833.4		

2028

Pollutant		INSIGNIFICANCE INDICATOR	
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	Action Emissions (ton/yr)	Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.928	250	No
NO _x	21.630	250	No
CO	-22.880	250	No
SO _x	1.023	250	No
PM 10	-0.528	250	No
PM 2.5	-0.124	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3095.1		

2029 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.928	250	No
NO _x	21.630	250	No
CO	-22.880	250	No
SO _x	1.023	250	No
PM 10	-0.528	250	No
PM 2.5	-0.124	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3095.1		

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

ALTERNATIVE 1

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: RANDOLPH AFB

State: Texas

County(s): McCulloch; San Saba; Llano

Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 1 (Brady MOA)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2023

- Action Purpose and Need:

The T 38 Talon is a twin-engine, high-altitude, supersonic jet used by the USAF and other nations for pilot training. The aircraft originally was developed in the 1950s with production occurring between 1961 and 1972. The fleet has undergone periodic upgrades overtime. In 2001, the USAF upgraded several hundred T 38s with modern avionics and replaced propulsion components to provide increased performance and superior reliability.

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NOx) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment. As provided by the noise data, aircraft will fly 2,920 annual low flight patterns in the steady state year within this MOA, and spend 10

minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2023 Additon of 138 T-7 LFP
3.	Aircraft	2023 Removal 138 T-38 LFP
4.	Aircraft	2024 Addition 241 LFP
5.	Aircraft	2024 Removal 241 T-38 LFP
6.	Aircraft	2025 Addition 515 T-7 LFP
7.	Aircraft	2025 Removal 515 T-38 LFP
8.	Aircraft	2026 Addition 488 T-7 LFP
9.	Aircraft	2026 Removal 488 T-38 LFP
10.	Aircraft	2027 Addition 713 T-7 LFP
11.	Aircraft	2027 Removal 713 T-38 LFP
12.	Aircraft	2028 Addition 184 T-7 LFP
13.	Aircraft	2028 Removal 184 T-38 LFP

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: McCulloch; San Saba; Llano
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Additon of 138 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.182578
SO _x	0.086061
NO _x	1.319068
CO	0.150406
PM 10	0.010456

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.008847
Pb	0.000000
NH ₃	0.000000
CO _{2e}	260.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.182578
SO _x	0.086061
NO _x	1.319068
CO	0.150406
PM 10	0.010456

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.008847
Pb	0.000000
NH ₃	0.000000
CO _{2e}	260.1

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 Emissions 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: 8
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 138
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0

Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Removal 138 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.065858
SO _x	-0.025348
NO _x	-0.016583
CO	-1.541508
PM 10	-0.042405

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.016346
Pb	0.000000
NH ₃	0.000000
CO ₂ e	-76.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.065858
SO _x	-0.025348
NO _x	-0.016583
CO	-1.541508
PM 10	-0.042405

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.016346
Pb	0.000000
NH ₃	0.000000
CO ₂ e	-76.6

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 10
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 138
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; San Saba; McCulloch

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Addition 241 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2024

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.318851
SO _x	0.150295
NO _x	2.303590
CO	0.262665
PM 10	0.018260

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.015451
Pb	0.000000
NH ₃	0.000000
CO _{2e}	454.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.318851
SO _x	0.150295
NO _x	2.303590
CO	0.262665
PM 10	0.018260

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.015451
Pb	0.000000
NH ₃	0.000000
CO _{2e}	454.3

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 Emissions 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: 10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 241
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2024 Removal 241 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2024
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.115013
SO _x	-0.044268
NO _x	-0.028960
CO	-2.692054
PM 10	-0.074055

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.028546
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-133.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.115013
SO _x	-0.044268
NO _x	-0.028960
CO	-2.692054
PM 10	-0.074055

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.028546
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-133.8

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	11
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	241
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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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5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

- County: Llano; McCulloch; San Saba
- Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 515 T-7 LFP

- Activity Description:

- Activity Start Date

- Start Month: 1
- Start Year: 2025

- Activity End Date
 Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.682005
SO _x	0.335977
NO _x	5.011448
CO	0.630179
PM 10	0.039021

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.033018
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1018.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.682005
SO _x	0.335977
NO _x	5.011448
CO	0.630179
PM 10	0.039021

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.033018
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1018.4

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 Emissions 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: 7
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 515
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2025 Removal 515 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2025
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.245775
SO _x	-0.094597
NO _x	-0.061886
CO	-5.752730
PM 10	-0.158251

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.061002
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-285.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.245775
SO _x	-0.094597
NO _x	-0.061886
CO	-5.752730
PM 10	-0.158251

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.061002
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-285.9

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 7
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 515
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PSIDLE} + AE_{PSAPPROACH} + AE_{PSINTERMEDIATE} + AE_{PSMILITARY} + AE_{PSAFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AE_{PSIDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AE_{PSAPPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AE_{PSINTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AE_{PSMILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AE_{PSAFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2026 Addition 488 T-7 LFP
- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.645639
SO _x	0.304332
NO _x	4.664532
CO	0.531870
PM 10	0.036975

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.031286
Pb	0.000000
NH ₃	0.000000
CO _{2e}	919.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.645639
SO _x	0.304332
NO _x	4.664532
CO	0.531870
PM 10	0.036975

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.031286
Pb	0.000000
NH ₃	0.000000
CO _{2e}	919.8

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 Emissions 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: 14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 488

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

8.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 488 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.232890
SO _x	-0.089637
NO _x	-0.058641
CO	-5.451131
PM 10	-0.149954

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.057804
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-270.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.232890
SO _x	-0.089637
NO _x	-0.058641
CO	-5.451131
PM 10	-0.149954

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.057804
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-270.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 16
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 488
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 713 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.943322
SO _x	0.444649
NO _x	6.815187
CO	0.777098
PM 10	0.054023

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.045712
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1343.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.943322
SO _x	0.444649
NO _x	6.815187
CO	0.777098
PM 10	0.054023

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.045712
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1343.9

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations	
Number of Aircraft:	19
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	713
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Removal 713 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.340267
SO _x	-0.130966
NO _x	-0.085679
CO	-7.964460
PM 10	-0.219093

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.084455
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-395.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.340267
SO _x	-0.130966
NO _x	-0.085679
CO	-7.964460
PM 10	-0.219093

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.084455
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-395.8

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 21
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 713
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9

Military (mins): 9
AfterBurn (mins): 3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 184 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2028

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.243668
SO _x	0.120038
NO _x	1.790498
CO	0.225151
PM 10	0.013941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.011797
Pb	0.000000
NH ₃	0.000000
CO _{2e}	363.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.243668
SO _x	0.120038
NO _x	1.790498
CO	0.225151
PM 10	0.013941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.011797
Pb	0.000000
NH ₃	0.000000
CO _{2e}	363.8

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	184
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 184 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.087811
SO _x	-0.033798
NO _x	-0.022111
CO	-2.055344
PM 10	-0.056540

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.021795
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-102.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.087811

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.021795

SO _x	-0.033798
NO _x	-0.022111
CO	-2.055344
PM 10	-0.056540

Pb	0.000000
NH ₃	0.000000
CO _{2e}	-102.2

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 184
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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

ALTERNATIVE 2

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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB

State: Texas

County(s): McCulloch; San Saba; Llano; McMullen

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 2 (Brady MOA)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment). As provided by the noise data, aircraft will fly 3,358 annual low flight patterns in the steady state year within this MOA, and spend 10 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

f. Point of Contact:

Name: AFCEC/CZTQ
 Title: USAF Air Quality Technical Authority
 Organization: AFCEC/CZ
 Email:
 Phone Number:

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

_____ applicable
 X not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.100	250	No
NOx	1.114	250	No
CO	-1.189	250	No
SOx	0.052	250	No
PM 10	-0.027	250	No
PM 2.5	-0.006	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	156.9		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	0.316	250	No
NO _x	3.530	250	No
CO	-3.770	250	No
SO _x	0.165	250	No
PM 10	-0.087	250	No
PM 2.5	-0.020	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	497.3		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.747	250	No
NO _x	8.412	250	No
CO	-8.823	250	No
SO _x	0.403	250	No
PM 10	-0.204	250	No
PM 2.5	-0.048	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	1219.8		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.154	250	No
NO _x	12.961	250	No
CO	-13.682	250	No
SO _x	0.615	250	No
PM 10	-0.316	250	No
PM 2.5	-0.074	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	1860.7		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.900	250	No
NO _x	21.286	250	No
CO	-22.573	250	No
SO _x	1.003	250	No
PM 10	-0.520	250	No
PM 2.5	-0.122	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3033.6		

2028

Pollutant		INSIGNIFICANCE INDICATOR	
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	Action Emissions (ton/yr)	Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.553	250	No
NO _x	28.686	250	No
CO	-30.232	250	No
SO _x	1.364	250	No
PM 10	-0.698	250	No
PM 2.5	-0.164	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4128.7		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.629	250	No
NO _x	29.545	250	No
CO	-31.149	250	No
SO _x	1.404	250	No
PM 10	-0.719	250	No
PM 2.5	-0.169	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4249.7		

2030

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.669	250	No
NO _x	29.997	250	No
CO	-31.617	250	No
SO _x	1.426	250	No
PM 10	-0.730	250	No
PM 2.5	-0.171	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4316.6		

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.653	250	No
NO _x	29.818	250	No
CO	-31.425	250	No
SO _x	1.417	250	No
PM 10	-0.726	250	No
PM 2.5	-0.170	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4291.3		

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.842	250	No
NO _x	31.922	250	No
CO	-33.673	250	No
SO _x	1.515	250	No
PM 10	-0.777	250	No
PM 2.5	-0.182	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4587.8		

2033 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.842	250	No
NO _x	31.922	250	No
CO	-33.673	250	No
SO _x	1.515	250	No
PM 10	-0.777	250	No
PM 2.5	-0.182	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4587.8		

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

ALTERNATIVE 2 DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: RANDOLPH AFB
State: Texas
County(s): McCulloch; San Saba; Llano; McMullen
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 2 (Brady MOA)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2023

- Action Purpose and Need:

The T 38 Talon is a twin-engine, high-altitude, supersonic jet used by the USAF and other nations for pilot training. The aircraft originally was developed in the 1950s with production occurring between 1961 and 1972. The fleet has undergone periodic upgrades overtime. In 2001, the USAF upgraded several hundred T 38s with modern avionics and replaced propulsion components to provide increased performance and superior reliability.

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment). As provided by the noise data, aircraft will fly 3,358 annual low flight patterns in the steady state year within this MOA, and spend 10

minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2023 Additon of 118 T-7 LFP
3.	Aircraft	2023 Removal 118 T-38 LFP
4.	Aircraft	2024 Addition 256 LFP
5.	Aircraft	2024 Removal 256 T-38 LFP
6.	Aircraft	2025 Addition 508 T-7 LFP
7.	Aircraft	2025 Removal 508 T-38 LFP
8.	Aircraft	2026 Addition 482 T-7 LFP
9.	Aircraft	2026 Removal 482 T-38 LFP
10.	Aircraft	2027 Addition 882 T-7 LFP
11.	Aircraft	2027 Removal 882 T-38 LFP
12.	Aircraft	2028 Addition 770 T-7 LFP
13.	Aircraft	2028 Removal 770 T-38 LFP
14.	Aircraft	2029 Addition 91 T-7 LFP
15.	Aircraft	2029 Remove 91 T-38 LFP
16.	Aircraft	2030 Addition 47 T-7 LFP
17.	Aircraft	2030 Removal 47 T-38 LFP
18.	Aircraft	2031 Removal 19 T-7A LFP
19.	Aircraft	2031 addition 19 T-38 LFP
20.	Aircraft	2032 Addition 223 T-7 LFP
21.	Aircraft	2032 Removal 223 T-38 LFP

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: McCulloch; San Saba; Llano
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Additon of 118 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.156118
SO _x	0.073589
NO _x	1.127899
CO	0.128608
PM 10	0.008941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.007565
Pb	0.000000
NH ₃	0.000000
CO _{2e}	222.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.156118
SO _x	0.073589
NO _x	1.127899
CO	0.128608
PM 10	0.008941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.007565
Pb	0.000000
NH ₃	0.000000
CO _{2e}	222.4

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 Emissions 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: 8
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 118
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

2.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2023 Removal 118 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2023
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.056314
SO _x	-0.021675
NO _x	-0.014180
CO	-1.318101
PM 10	-0.036259

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.013977
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-65.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.056314
SO _x	-0.021675
NO _x	-0.014180
CO	-1.318101
PM 10	-0.036259

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.013977
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-65.5

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft: 10
 - Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 118
 - Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 - Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi/Idle Out [Idle] (mins): 0
 - Takeoff [Military] (mins): 0
 - Takeoff [After Burn] (mins): 0
 - Climb Out [Intermediate] (mins): 10
 - Approach [Approach] (mins): 0
 - Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins): 12
 - Approach (mins): 27
 - Intermediate (mins): 9
 - Military (mins): 9
 - AfterBurn (mins): 3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; San Saba; McCulloch
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Addition 256 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2024

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.338696
SO _x	0.159650
NO _x	2.446967
CO	0.279014
PM 10	0.019397

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.016413
Pb	0.000000
NH ₃	0.000000
CO _{2e}	482.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.338696
SO _x	0.159650
NO _x	2.446967
CO	0.279014
PM 10	0.019397

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.016413
Pb	0.000000
NH ₃	0.000000
CO _{2e}	482.5

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 Emissions 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: 10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 256

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Removal 256 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2024

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.122172
SO _x	-0.047023
NO _x	-0.030763
CO	-2.859610
PM 10	-0.078665

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.030323
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-142.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.122172
SO _x	-0.047023
NO _x	-0.030763
CO	-2.859610
PM 10	-0.078665

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.030323
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-142.1

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 11
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 256
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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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5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 508 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2025

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.672735
SO _x	0.331410
NO _x	4.943331
CO	0.621613
PM 10	0.038490

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032569
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1004.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.672735
SO _x	0.331410
NO _x	4.943331
CO	0.621613
PM 10	0.038490

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032569
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1004.5

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 Emissions 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:	7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	508
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Removal 508 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2025

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.242435
SO _x	-0.093311
NO _x	-0.061045
CO	-5.674538
PM 10	-0.156100

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.060173
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-282.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.242435
SO _x	-0.093311
NO _x	-0.061045

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.060173
Pb	0.000000
NH ₃	0.000000

CO	-5.674538
PM 10	-0.156100

CO _{2e}	-282.0

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 7
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 508
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12

Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)

- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Addition 482 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.637701
SO _x	0.300590
NO _x	4.607181
CO	0.525331
PM 10	0.036520

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.030902
Pb	0.000000
NH ₃	0.000000
CO _{2e}	908.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.637701
SO _x	0.300590
NO _x	4.607181
CO	0.525331
PM 10	0.036520

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.030902
Pb	0.000000
NH ₃	0.000000
CO _{2e}	908.5

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 Emissions 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:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	482
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 482 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.230026
SO _x	-0.088535
NO _x	-0.057920
CO	-5.384109
PM 10	-0.148111

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.057093
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-267.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.230026

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.057093

SO _x	-0.088535
NO _x	-0.057920
CO	-5.384109
PM 10	-0.148111

Pb	0.000000
NH ₃	0.000000
CO _{2e}	-267.6

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 16
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 482
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 882 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.166914
SO _x	0.550043
NO _x	8.430568
CO	0.961290
PM 10	0.066828

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.056546
Pb	0.000000
NH ₃	0.000000
CO ₂ e	1662.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.166914
SO _x	0.550043
NO _x	8.430568
CO	0.961290
PM 10	0.066828

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.056546
Pb	0.000000
NH ₃	0.000000
CO ₂ e	1662.5

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	19
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	882
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Removal 882 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.420920
SO _x	-0.162009
NO _x	-0.105987
CO	-9.852249
PM 10	-0.271024

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.104473
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-489.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.420920
SO _x	-0.162009
NO _x	-0.105987
CO	-9.852249
PM 10	-0.271024

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.104473
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-489.7

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 21
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 882
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 770 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.019697
SO _x	0.502334
NO _x	7.492844
CO	0.942209
PM 10	0.058342

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.049366
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1522.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.019697
SO _x	0.502334
NO _x	7.492844
CO	0.942209
PM 10	0.058342

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.049366
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1522.6

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	770
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

A_{ELTO} : Aircraft Emissions (TONs)
 $A_{EM_{IDLE_IN}}$: Aircraft Emissions for Idle-In Mode (TONs)
 $A_{EM_{IDLE_OUT}}$: Aircraft Emissions for Idle-Out Mode (TONs)
 $A_{EM_{APPROACH}}$: Aircraft Emissions for Approach Mode (TONs)
 $A_{EM_{CLIMBOUT}}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $A_{EM_{TAKEOFF}}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$A_{EM_{POL}} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

$A_{EM_{POL}}$: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$A_{ETGO} = A_{EM_{APPROACH}} + A_{EM_{CLIMBOUT}} + A_{EM_{TAKEOFF}}$$

A_{ETGO} : Aircraft Emissions (TONs)
 $A_{EM_{APPROACH}}$: Aircraft Emissions for Approach Mode (TONs)
 $A_{EM_{CLIMBOUT}}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $A_{EM_{TAKEOFF}}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$A_{EPS_{POL}} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$A_{EPS_{POL}}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$A_{ETRIM} = A_{EPS_{IDLE}} + A_{EPS_{APPROACH}} + A_{EPS_{INTERMEDIATE}} + A_{EPS_{MILITARY}} + A_{EPS_{AFTERBURN}}$$

A_{ETRIM} : Aircraft Emissions (TONs)
 $A_{EPS_{IDLE}}$: Aircraft Emissions for Idle Power Setting (TONs)
 $A_{EPS_{APPROACH}}$: Aircraft Emissions for Approach Power Setting (TONs)
 $A_{EPS_{INTERMEDIATE}}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $A_{EPS_{MILITARY}}$: Aircraft Emissions for Military Power Setting (TONs)
 $A_{EPS_{AFTERBURN}}$: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 770 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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VOC	-0.367470
SO _x	-0.141436
NO _x	-0.092528
CO	-8.601170
PM 10	-0.236608

PM 2.5	-0.091207
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-427.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.367470
SO _x	-0.141436
NO _x	-0.092528
CO	-8.601170
PM 10	-0.236608

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.091207
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-427.5

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 770
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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
 EFPOL: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2029 Addition 91 T-7 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2029
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.120396
SO _x	0.056750
NO _x	0.869820
CO	0.099181
PM 10	0.006895

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.005834
Pb	0.000000
NH ₃	0.000000
CO _{2e}	171.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.120396
SO _x	0.056750
NO _x	0.869820
CO	0.099181
PM 10	0.006895

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.005834
Pb	0.000000
NH ₃	0.000000
CO _{2e}	171.5

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 Emissions 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:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	91
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14.4 Auxiliary Power Unit (APU)

14.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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14.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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14.4.3 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

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2029 Remove 91 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2029

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.043428
SO _x	-0.016715
NO _x	-0.010935
CO	-1.016502
PM 10	-0.027963

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.010779
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-50.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.043428
SO _x	-0.016715
NO _x	-0.010935
CO	-1.016502
PM 10	-0.027963

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.010779
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-50.5

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 6
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 91
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15.4 Auxiliary Power Unit (APU)

15.4.1 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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15.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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15.4.3 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

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Addition 47 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2030

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.062241
SO _x	0.030662
NO _x	0.457355
CO	0.057511
PM 10	0.003561

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.003013
Pb	0.000000
NH ₃	0.000000
CO _{2e}	92.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.062241
SO _x	0.030662
NO _x	0.457355
CO	0.057511
PM 10	0.003561

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.003013
Pb	0.000000
NH ₃	0.000000
CO _{2e}	92.9

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 47
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16.4 Auxiliary Power Unit (APU)

16.4.1 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

16.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

16.4.3 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. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Removal 47 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.022430
SO _x	-0.008633
NO _x	-0.005648
CO	-0.525006
PM 10	-0.014442

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.005567
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-26.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.022430
SO _x	-0.008633
NO _x	-0.005648
CO	-0.525006
PM 10	-0.014442

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.005567
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-26.1

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 47

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

17.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 Removal 19 T-7A LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2031

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.025138
SO _x	-0.011849
NO _x	-0.181611
CO	-0.020708
PM 10	-0.001440

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.001218
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-35.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.025138
SO _x	-0.011849
NO _x	-0.181611
CO	-0.020708
PM 10	-0.001440

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.001218
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-35.8

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 19
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

18.4 Auxiliary Power Unit (APU)

18.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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18.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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18.4.3 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

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McMullen; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 addition 19 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2031

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.009067
SO _x	0.003490
NO _x	0.002283
CO	0.212237
PM 10	0.005838

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002251
Pb	0.000000
NH ₃	0.000000
CO _{2e}	10.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.009067
SO _x	0.003490
NO _x	0.002283
CO	0.212237
PM 10	0.005838

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002251
Pb	0.000000
NH ₃	0.000000
CO _{2e}	10.5

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations	
Number of Aircraft:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	19
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions 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

19.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	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: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Addition 223 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.295036
SO _x	0.139070
NO _x	2.131538
CO	0.243047
PM 10	0.016896

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.014297
Pb	0.000000
NH ₃	0.000000
CO _{2e}	420.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.295036
SO _x	0.139070
NO _x	2.131538
CO	0.243047
PM 10	0.016896

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.014297
Pb	0.000000
NH ₃	0.000000
CO _{2e}	420.3

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 223
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20.4 Auxiliary Power Unit (APU)

20.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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20.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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20.4.3 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. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Removal 223 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.106423
SO _x	-0.040961
NO _x	-0.026797
CO	-2.490988
PM 10	-0.068524

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.026414
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-123.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.106423
SO _x	-0.040961
NO _x	-0.026797
CO	-2.490988
PM 10	-0.068524

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.026414
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-123.8

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	223
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

ALTERNATIVE 3

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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB

State: Texas

County(s): McCulloch; San Saba; Llano; McMullen

Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 3 (Brady MOA)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment). As provided by the noise data, aircraft will fly 3,650 annual low flight patterns in the steady state year within this MOA, and spend 10 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

f. Point of Contact:

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

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

_____ applicable
 X not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.100	250	No
NOx	1.114	250	No
CO	-1.189	250	No
SOx	0.052	250	No
PM 10	-0.027	250	No
PM 2.5	-0.006	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	156.9		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	0.343	250	No
NO _x	3.832	250	No
CO	-4.093	250	No
SO _x	0.179	250	No
PM 10	-0.094	250	No
PM 2.5	-0.022	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	539.9		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.812	250	No
NO _x	9.147	250	No
CO	-9.593	250	No
SO _x	0.438	250	No
PM 10	-0.222	250	No
PM 2.5	-0.052	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	1326.4		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.255	250	No
NO _x	14.092	250	No
CO	-14.875	250	No
SO _x	0.668	250	No
PM 10	-0.343	250	No
PM 2.5	-0.081	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	2023.1		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.065	250	No
NO _x	23.134	250	No
CO	-24.532	250	No
SO _x	1.090	250	No
PM 10	-0.565	250	No
PM 2.5	-0.133	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	3297.0		

2028

Pollutant		INSIGNIFICANCE INDICATOR	
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	Action Emissions (ton/yr)	Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.774	250	No
NO _x	31.179	250	No
CO	-32.858	250	No
SO _x	1.482	250	No
PM 10	-0.759	250	No
PM 2.5	-0.178	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4487.5		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.857	250	No
NO _x	32.103	250	No
CO	-33.846	250	No
SO _x	1.525	250	No
PM 10	-0.782	250	No
PM 2.5	-0.183	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4617.8		

2030

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.900	250	No
NO _x	32.594	250	No
CO	-34.353	250	No
SO _x	1.549	250	No
PM 10	-0.793	250	No
PM 2.5	-0.186	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4690.3		

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.883	250	No
NO _x	32.405	250	No
CO	-34.151	250	No
SO _x	1.540	250	No
PM 10	-0.789	250	No
PM 2.5	-0.185	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4663.7		

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.088	250	No
NO _x	34.689	250	No
CO	-36.591	250	No
SO _x	1.647	250	No
PM 10	-0.845	250	No
PM 2.5	-0.198	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4985.5		

2033 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.088	250	No
NO _x	34.689	250	No
CO	-36.591	250	No
SO _x	1.647	250	No
PM 10	-0.845	250	No
PM 2.5	-0.198	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	4985.5		

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

ALTERNATIVE 3 DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: RANDOLPH AFB
State: Texas
County(s): McCulloch; San Saba; Llano; McMullen
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 3 (Brady MOA)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2023

- Action Purpose and Need:

The T 38 Talon is a twin-engine, high-altitude, supersonic jet used by the USAF and other nations for pilot training. The aircraft originally was developed in the 1950s with production occurring between 1961 and 1972. The fleet has undergone periodic upgrades overtime. In 2001, the USAF upgraded several hundred T 38s with modern avionics and replaced propulsion components to provide increased performance and superior reliability.

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the Brady MOA, which lies within McCulloch, San Saba and Llano County (all classified as attainment). As provided by the noise data, aircraft will fly 3,650 annual low flight patterns in the steady state year within this MOA, and spend 10

minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2023 Additon of 118 T-7 LFP
3.	Aircraft	2023 Removal 118 T-38 LFP
4.	Aircraft	2024 Addition 288 LFP
5.	Aircraft	2024 Removal 288 T-38 LFP
6.	Aircraft	2025 Addition 553 T-7 LFP
7.	Aircraft	2025 Removal 553 T-38 LFP
8.	Aircraft	2026 Addition 524 T-7 LFP
9.	Aircraft	2026 Removal 524 T-38 LFP
10.	Aircraft	2027 Addition 958 T-7 LFP
11.	Aircraft	2027 Removal 958 T-38 LFP
12.	Aircraft	2028 Addition 837 T-7 LFP
13.	Aircraft	2028 Removal 837 T-38 LFP
14.	Aircraft	2029 Addition 98 T-7 LFP
15.	Aircraft	2029 Remove 98 T-38 LFP
16.	Aircraft	2030 Addition 51 T-7 LFP
17.	Aircraft	2030 Removal 51 T-38 LFP
18.	Aircraft	2031 Removal 20 T-7A LFP
19.	Aircraft	2031 addition 20 T-38 LFP
20.	Aircraft	2032 Addition 242 T-7 LFP
21.	Aircraft	2032 Removal 242 T-38 LFP

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: McCulloch; San Saba; Llano
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Additon of 118 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.156118
SO _x	0.073589
NO _x	1.127899
CO	0.128608
PM 10	0.008941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.007565
Pb	0.000000
NH ₃	0.000000
CO _{2e}	222.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.156118
SO _x	0.073589
NO _x	1.127899
CO	0.128608
PM 10	0.008941

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.007565
Pb	0.000000
NH ₃	0.000000
CO _{2e}	222.4

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 Emissions 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: 8
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 118
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

2.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2023 Removal 118 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2023
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.056314
SO _x	-0.021675
NO _x	-0.014180
CO	-1.318101
PM 10	-0.036259

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.013977
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-65.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.056314
SO _x	-0.021675
NO _x	-0.014180
CO	-1.318101
PM 10	-0.036259

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.013977
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-65.5

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 10
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 118
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PSIDLE} + AE_{PSAPPROACH} + AE_{PSINTERMEDIATE} + AE_{PSMILITARY} + AE_{PSAFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AE_{PSIDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AE_{PSAPPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AE_{PSINTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AE_{PSMILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AE_{PSAFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; San Saba; McCulloch
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Addition 288 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2024

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.381033
SO _x	0.179606
NO _x	2.752838
CO	0.313891
PM 10	0.021821

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.018464
Pb	0.000000
NH ₃	0.000000
CO _{2e}	542.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.381033
SO _x	0.179606
NO _x	2.752838
CO	0.313891
PM 10	0.021821

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.018464
Pb	0.000000
NH ₃	0.000000
CO _{2e}	542.8

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 Emissions 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: 10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 288

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Removal 288 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2024

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.137443
SO _x	-0.052901
NO _x	-0.034608
CO	-3.217061
PM 10	-0.088498

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.034114
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-159.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.137443
SO _x	-0.052901
NO _x	-0.034608
CO	-3.217061
PM 10	-0.088498

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.034114
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-159.9

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 11
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 288
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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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5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 553 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2025

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.732328
SO _x	0.360767
NO _x	5.381225
CO	0.676678
PM 10	0.041900

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.035454
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1093.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.732328
SO _x	0.360767
NO _x	5.381225
CO	0.676678
PM 10	0.041900

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.035454
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1093.5

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 Emissions 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:	7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	553
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Removal 553 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2025

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.263910
SO _x	-0.101577
NO _x	-0.066452
CO	-6.177204
PM 10	-0.169928

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.065503
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-307.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.263910
SO _x	-0.101577
NO _x	-0.066452

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.065503
Pb	0.000000
NH ₃	0.000000

CO	-6.177204
PM 10	-0.169928

CO _{2e}	-307.0

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 7
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 553
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12

Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)

- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Addition 524 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.693269
SO _x	0.326783
NO _x	5.008637
CO	0.571107
PM 10	0.039703

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.033595
Pb	0.000000
NH ₃	0.000000
CO _{2e}	987.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.693269
SO _x	0.326783
NO _x	5.008637
CO	0.571107
PM 10	0.039703

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.033595
Pb	0.000000
NH ₃	0.000000
CO _{2e}	987.7

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 Emissions 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:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	524
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 524 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.250070
SO _x	-0.096250
NO _x	-0.062967
CO	-5.853263
PM 10	-0.161016

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.062068
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-290.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.250070

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.062068

SO _x	-0.096250
NO _x	-0.062967
CO	-5.853263
PM 10	-0.161016

Pb	0.000000
NH ₃	0.000000
CO _{2e}	-290.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 16
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 524
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 958 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.267464
SO _x	0.597439
NO _x	9.157011
CO	1.044123
PM 10	0.072586

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.061419
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1805.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.267464
SO _x	0.597439
NO _x	9.157011
CO	1.044123
PM 10	0.072586

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.061419
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1805.7

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	19
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	958
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Removal 958 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.457190
SO _x	-0.175969
NO _x	-0.115120
CO	-10.701195
PM 10	-0.294377

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.113475
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-531.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.457190
SO _x	-0.175969
NO _x	-0.115120
CO	-10.701195
PM 10	-0.294377

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.113475
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-531.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 21
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 958
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 10
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 837 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.108424
SO _x	0.546043
NO _x	8.144819
CO	1.024194
PM 10	0.063418

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.053661
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1655.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.108424
SO _x	0.546043
NO _x	8.144819
CO	1.024194
PM 10	0.063418

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.053661
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1655.1

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	837
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

A_{ELTO} : Aircraft Emissions (TONs)
 $A_{EM_{IDLE_IN}}$: Aircraft Emissions for Idle-In Mode (TONs)
 $A_{EM_{IDLE_OUT}}$: Aircraft Emissions for Idle-Out Mode (TONs)
 $A_{EM_{APPROACH}}$: Aircraft Emissions for Approach Mode (TONs)
 $A_{EM_{CLIMBOUT}}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $A_{EM_{TAKEOFF}}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$A_{EM_{POL}} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

$A_{EM_{POL}}$: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$A_{ETGO} = A_{EM_{APPROACH}} + A_{EM_{CLIMBOUT}} + A_{EM_{TAKEOFF}}$$

A_{ETGO} : Aircraft Emissions (TONs)
 $A_{EM_{APPROACH}}$: Aircraft Emissions for Approach Mode (TONs)
 $A_{EM_{CLIMBOUT}}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $A_{EM_{TAKEOFF}}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$A_{EPS_{POL}} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$A_{EPS_{POL}}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$A_{ETRIM} = A_{EPS_{IDLE}} + A_{EPS_{APPROACH}} + A_{EPS_{INTERMEDIATE}} + A_{EPS_{MILITARY}} + A_{EPS_{AFTERBURN}}$$

A_{ETRIM} : Aircraft Emissions (TONs)
 $A_{EPS_{IDLE}}$: Aircraft Emissions for Idle Power Setting (TONs)
 $A_{EPS_{APPROACH}}$: Aircraft Emissions for Approach Power Setting (TONs)
 $A_{EPS_{INTERMEDIATE}}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $A_{EPS_{MILITARY}}$: Aircraft Emissions for Military Power Setting (TONs)
 $A_{EPS_{AFTERBURN}}$: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 837 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
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Pollutant	Emissions Per Year (TONs)
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VOC	-0.399444
SO _x	-0.153743
NO _x	-0.100580
CO	-9.349583
PM 10	-0.257196

PM 2.5	-0.099143
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-464.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.399444
SO _x	-0.153743
NO _x	-0.100580
CO	-9.349583
PM 10	-0.257196

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.099143
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-464.7

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 837
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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
 EFPOL: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2029 Addition 98 T-7 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2029
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.129657
SO _x	0.061116
NO _x	0.936730
CO	0.106810
PM 10	0.007425

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.006283
Pb	0.000000
NH ₃	0.000000
CO _{2e}	184.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.129657
SO _x	0.061116
NO _x	0.936730
CO	0.106810
PM 10	0.007425

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.006283
Pb	0.000000
NH ₃	0.000000
CO _{2e}	184.7

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 Emissions 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:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	98
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

14.4 Auxiliary Power Unit (APU)

14.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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14.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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14.4.3 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

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2029 Remove 98 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2029

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.046769
SO _x	-0.018001
NO _x	-0.011776
CO	-1.094694
PM 10	-0.030114

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.011608
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-54.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.046769
SO _x	-0.018001
NO _x	-0.011776
CO	-1.094694
PM 10	-0.030114

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.011608
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-54.4

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 6
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 98
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15.4 Auxiliary Power Unit (APU)

15.4.1 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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15.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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15.4.3 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

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Addition 51 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2030

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.067538
SO _x	0.033271
NO _x	0.496279
CO	0.062406
PM 10	0.003864

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.003270
Pb	0.000000
NH ₃	0.000000
CO _{2e}	100.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.067538
SO _x	0.033271
NO _x	0.496279
CO	0.062406
PM 10	0.003864

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.003270
Pb	0.000000
NH ₃	0.000000
CO _{2e}	100.8

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 51
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16.4 Auxiliary Power Unit (APU)

16.4.1 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

16.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

16.4.3 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. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Removal 51 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.024339
SO _x	-0.009368
NO _x	-0.006129
CO	-0.569688
PM 10	-0.015671

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.006041
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-28.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.024339
SO _x	-0.009368
NO _x	-0.006129
CO	-0.569688
PM 10	-0.015671

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.006041
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-28.3

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 51

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 Removal 20 T-7A LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2031

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.026461
SO _x	-0.012473
NO _x	-0.191169
CO	-0.021798
PM 10	-0.001515

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.001282
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-37.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.026461
SO _x	-0.012473
NO _x	-0.191169
CO	-0.021798
PM 10	-0.001515

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.001282
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-37.7

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 20
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

18.4 Auxiliary Power Unit (APU)

18.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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18.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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18.4.3 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

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McMullen; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 addition 20 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2031

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.009545
SO _x	0.003674
NO _x	0.002403
CO	0.223407
PM 10	0.006146

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002369
Pb	0.000000
NH ₃	0.000000
CO _{2e}	11.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.009545
SO _x	0.003674
NO _x	0.002403
CO	0.223407
PM 10	0.006146

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002369
Pb	0.000000
NH ₃	0.000000
CO _{2e}	11.1

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations	
Number of Aircraft:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	20
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions 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

19.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	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: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Addition 242 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.320174
SO _x	0.150919
NO _x	2.313149
CO	0.263755
PM 10	0.018336

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.015515
Pb	0.000000
NH ₃	0.000000
CO _{2e}	456.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.320174
SO _x	0.150919
NO _x	2.313149
CO	0.263755
PM 10	0.018336

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.015515
Pb	0.000000
NH ₃	0.000000
CO _{2e}	456.1

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 242
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 10
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20.4 Auxiliary Power Unit (APU)

20.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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20.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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20.4.3 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. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Removal 242 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.115490
SO _x	-0.044451
NO _x	-0.029080
CO	-2.703225
PM 10	-0.074363

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.028665
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-134.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.115490
SO _x	-0.044451
NO _x	-0.029080
CO	-2.703225
PM 10	-0.074363

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.028665
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-134.4

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	242
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	10
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

E-4 AIRSPACE ROI 2 (MTRs and McMullen Range R-6132)

Counties in the ACAM analysis for Airspace ROI 2 include:

Atascosa	De Witt	Kendall
Bandera	Dimmit	La Salle
Bastrop	Frio	Live Oak
Bee	Gonzales	McMullen
Blanco	Hays	Uvalde
Caldwell	Jim Wells	Webb
Comal	Karnes	Zavala

The content of Section E-4 presents the data and methodology used for preparing aircraft operations data for the ACAM modeling followed by the ACAM results.

This section includes the following:

- Proposed Action ACAM Report
- Proposed Action ACAM Detailed Report
- Alternative 1 ACAM Report
- Alternative 1 ACAM Detailed Report
- Alternative 2 ACAM Report
- Alternative 2 ACAM Detailed Report
- Alternative 3 ACAM Report
- Alternative 3 ACAM Detailed Report

PROPOSED ACTION 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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB
State: Texas
County(s): Atascosa
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Proposed Action (VR140, VR156, VR1120 and R6132 Range)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 5840 annual low flight patterns in the steady state year within this MOA, and spend a weighted average of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

Atascosa
Bandera
Bastrop
Bee
Blanco
Caldwell
Comal
De Witt
Dimmit
Frio
Gonzales
Hays
Jim Wells
Karnes
Kendall
Kendall
La Salle
Live Oak
McMullen
Uvalde
Webb
Zavala

All counties are in attainment for all NAAQS.

f. Point of Contact:

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

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

applicable
 not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance

indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.548	250	No
NOx	4.797	250	No
CO	-2.258	250	No
SOx	0.269	250	No
PM 10	-0.039	250	No
PM 2.5	0.003	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	812.4		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.294	250	No
NOx	13.124	250	No
CO	-11.152	250	No
SOx	0.657	250	No
PM 10	-0.243	250	No
PM 2.5	-0.045	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	1985.5		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	2.889	250	No
NOx	31.056	250	No
CO	-30.023	250	No
SOx	1.511	250	No
PM 10	-0.679	250	No
PM 2.5	-0.148	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	4572.2		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	4.399	250	No
NOx	47.911	250	No
CO	-48.025	250	No
SOx	2.297	250	No
PM 10	-1.093	250	No
PM 2.5	-0.245	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	6946.8		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	7.162	250	No
NOx	78.744	250	No
CO	-80.956	250	No
SOx	3.734	250	No
PM 10	-1.849	250	No
PM 2.5	-0.422	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	11290.7		

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	9.579	250	No
NOx	105.927	250	Yes
CO	-109.562	250	No
SOx	5.029	250	No
PM 10	-2.510	250	No
PM 2.5	-0.577	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	15211.8		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	9.862	250	No
NOx	109.085	250	Yes
CO	-112.934	250	No
SOx	5.176	250	No
PM 10	-2.588	250	No
PM 2.5	-0.596	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	15656.7		

2030

Pollutant		INSIGNIFICANCE INDICATOR	
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	Action Emissions (ton/yr)	Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.008	250	No
NO _x	110.728	250	Yes
CO	-114.663	250	No
SO _x	5.254	250	No
PM 10	-2.628	250	No
PM 2.5	-0.605	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	15893.7		

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	9.951	250	No
NO _x	110.084	250	Yes
CO	-113.976	250	No
SO _x	5.224	250	No
PM 10	-2.612	250	No
PM 2.5	-0.601	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	15803.0		

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.648	250	No
NO _x	117.868	250	Yes
CO	-122.289	250	No
SO _x	5.587	250	No
PM 10	-2.803	250	No
PM 2.5	-0.646	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	16899.6		

2033 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.648	250	No
NO _x	117.868	250	Yes
CO	-122.289	250	No
SO _x	5.587	250	No
PM 10	-2.803	250	No
PM 2.5	-0.646	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	16899.6		

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.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

PROPOSED ACTION

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: RANDOLPH AFB
State: Texas
County(s): Atascosa
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Proposed Action (VR140, VR156, VR1120 and R6132 Range)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2023

- Action Purpose and Need:

The T 38 Talon is a twin-engine, high-altitude, supersonic jet used by the USAF and other nations for pilot training. The aircraft originally was developed in the 1950s with production occurring between 1961 and 1972. The fleet has undergone periodic upgrades overtime. In 2001, the USAF upgraded several hundred T 38s with modern avionics and replaced propulsion components to provide increased performance and superior reliability.

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 5840 annual low flight patterns in the

steady state year within this MOA, and spend a weighted average of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

- Atascosa
- Bandera
- Bastrop
- Bee
- Blanco
- Caldwell
- Comal
- De Witt
- Dimmit
- Frio
- Gonzales
- Hays
- Jim Wells
- Karnes
- Kendall
- Kendall
- La Salle
- Live Oak
- McMullen
- Uvalde
- Webb
- Zavala

All counties are in attainment for all NAAQS.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

	Activity Type	Activity Title
2.	Aircraft	2023 Additon of 237 T-7 LFP
3.	Aircraft	2023 Removal 237 T-38 LFP
4.	Aircraft	2024 Addition 414 LFP
5.	Aircraft	2024 Removal 414 T-38 LFP
6.	Aircraft	2025 Addition 884 T-7 LFP
7.	Aircraft	2025 Removal 884 T-38 LFP
8.	Aircraft	2026 Addition 838 T-7 LFP
9.	Aircraft	2026 Removal 838 T-38 LFP
10.	Aircraft	2027 Addition 1533 T-7 LFP
11.	Aircraft	2027 Removal 1533 T-38 LFP
12.	Aircraft	2028 Addition 1340 T-7 LFP
13.	Aircraft	2028 Removal 1340 T-38 LFP
14.	Aircraft	2029 Addition 157 T-7 LFP
15.	Aircraft	2029 Remove 157 T-38 LFP
16.	Aircraft	2030 Addition 81 T-7 LFP
17.	Aircraft	2030 Removal 81 T-38 LFP

18.	Aircraft	2031 Removal 32 T-7A LFP
19.	Aircraft	2031 addition 32 T-38 LFP
20.	Aircraft	2032 Addition 387 T-7 LFP
21.	Aircraft	2032 Removal 387 T-38 LFP

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: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Additon of 237 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.668193
SO _x	0.314963
NO _x	4.827475
CO	0.550450
PM 10	0.038267

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032379
Pb	0.000000
NH ₃	0.000000
CO _{2e}	952.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.668193
SO _x	0.314963
NO _x	4.827475
CO	0.550450
PM 10	0.038267

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032379
Pb	0.000000
NH ₃	0.000000
CO _{2e}	952.0

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 Emissions 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: 8
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 237
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)

60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Removal 237 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.120004
SO _x	-0.046189
NO _x	-0.030217
CO	-2.808874
PM 10	-0.077269

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.029785
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-139.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.120004
SO _x	-0.046189
NO _x	-0.030217
CO	-2.808874
PM 10	-0.077269

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.029785
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-139.6

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 10
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 118

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Addition 414 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2024

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.167224
SO _x	0.550189
NO _x	8.432804
CO	0.961545
PM 10	0.066845

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.056561
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1662.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.167224
SO _x	0.550189
NO _x	8.432804
CO	0.961545
PM 10	0.066845

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.056561
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1662.9

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 Emissions 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: 10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 414
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Removal 414 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2024

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.421031
SO _x	-0.162052
NO _x	-0.106015
CO	-9.854863
PM 10	-0.271096

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.104501
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-489.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.421031
SO _x	-0.162052
NO _x	-0.106015
CO	-9.854863
PM 10	-0.271096

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.104501
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-489.8

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations	
Number of Aircraft:	11
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	414
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 884 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2025

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	2.493437
SO _x	1.200215
NO _x	18.158768
CO	2.171390
PM 10	0.142733

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.120774
Pb	0.000000
NH ₃	0.000000
CO _{2e}	3632.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.493437
SO _x	1.200215
NO _x	18.158768
CO	2.171390
PM 10	0.142733

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.120774
Pb	0.000000
NH ₃	0.000000
CO _{2e}	3632.6

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 Emissions 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: 7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 884
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

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

- Activity Title: 2025 Removal 884 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2025

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.899014
SO _x	-0.346023
NO _x	-0.226370
CO	-21.042750
PM 10	-0.578862

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.223137
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1045.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.899014
SO _x	-0.346023
NO _x	-0.226370
CO	-21.042750
PM 10	-0.578862

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.223137
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1045.8

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	884
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Addition 838 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	2.362641
SO _x	1.113668
NO _x	17.069299
CO	1.946316
PM 10	0.135305

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.114489
Pb	0.000000
NH ₃	0.000000
CO _{2e}	3366.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.362641

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.114489

SO _x	1.113668
NO _x	17.069299
CO	1.946316
PM 10	0.135305

Pb	0.000000
NH ₃	0.000000
CO _{2e}	3366.0

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 Emissions 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: 14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 838
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9

Military (mins): 9
AfterBurn (mins): 3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 838 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.852233
SO _x	-0.328018
NO _x	-0.214591
CO	-19.947765
PM 10	-0.548740

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.211525
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-991.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.852233
SO _x	-0.328018
NO _x	-0.214591
CO	-19.947765
PM 10	-0.548740

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.211525
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-991.4

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234

Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	16
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	838
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 1533 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	4.322110
SO _x	2.037294
NO _x	31.225819
CO	3.560505
PM 10	0.247522

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.209441
Pb	0.000000
NH ₃	0.000000
CO _{2e}	6157.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.322110
SO _x	2.037294
NO _x	31.225819
CO	3.560505
PM 10	0.247522

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.209441
Pb	0.000000
NH ₃	0.000000
CO _{2e}	6157.6

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 19
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1533
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

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

- Activity Title: 2027 Removal 1533 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.559037
SO _x	-0.600061
NO _x	-0.392563
CO	-36.491556
PM 10	-1.003840

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.386955
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1813.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.559037
SO _x	-0.600061
NO _x	-0.392563
CO	-36.491556
PM 10	-1.003840

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.386955
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1813.6

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	21
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1533
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 1340 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	3.779645
SO _x	1.819330
NO _x	27.525734

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.183073
Pb	0.000000
NH ₃	0.000000

CO	3.291473
PM 10	0.216360

CO _{2e}	5506.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	3.779645
SO _x	1.819330
NO _x	27.525734
CO	3.291473
PM 10	0.216360

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.183073
Pb	0.000000
NH ₃	0.000000
CO _{2e}	5506.4

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1340
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 1340 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.362759
SO _x	-0.524515
NO _x	-0.343141
CO	-31.897381
PM 10	-0.877460

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.338239
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1585.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.362759
SO _x	-0.524515
NO _x	-0.343141
CO	-31.897381
PM 10	-0.877460

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.338239
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1585.3

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1340
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2029 Addition 157 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2029

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.442643
SO _x	0.208647
NO _x	3.197948
CO	0.364644
PM 10	0.025350

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.021450
Pb	0.000000
NH ₃	0.000000
CO _{2e}	630.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.442643
SO _x	0.208647
NO _x	3.197948
CO	0.364644
PM 10	0.025350

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.021450
Pb	0.000000
NH ₃	0.000000
CO _{2e}	630.6

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 157
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

14.4 Auxiliary Power Unit (APU)

14.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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14.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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14.4.3 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

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2029 Remove 157 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2029
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.159667
SO _x	-0.061454
NO _x	-0.040204
CO	-3.737230
PM 10	-0.102807

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.039629
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-185.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.159667
SO _x	-0.061454
NO _x	-0.040204
CO	-3.737230
PM 10	-0.102807

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.039629
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-185.7

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft: 6
 - Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 157
 - Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 - Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi/Idle Out [Idle] (mins): 0
 - Takeoff [Military] (mins): 0
 - Takeoff [After Burn] (mins): 0
 - Climb Out [Intermediate] (mins): 21.31
 - Approach [Approach] (mins): 0
 - Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins): 12
 - Approach (mins): 27
 - Intermediate (mins): 9
 - Military (mins): 9
 - AfterBurn (mins): 3

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15.4 Auxiliary Power Unit (APU)

15.4.1 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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15.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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15.4.3 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

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Addition 81 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date
 Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.228471
SO _x	0.109974
NO _x	1.663869
CO	0.198962
PM 10	0.013078

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.011066
Pb	0.000000
NH ₃	0.000000
CO _{2e}	332.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.228471
SO _x	0.109974
NO _x	1.663869
CO	0.198962
PM 10	0.013078

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.011066
Pb	0.000000
NH ₃	0.000000
CO _{2e}	332.8

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 Emissions 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: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 81
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

16.4 Auxiliary Power Unit (APU)

16.4.1 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

16.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

16.4.3 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. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2030 Removal 81 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2030
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.082376
SO _x	-0.031706
NO _x	-0.020742
CO	-1.928125
PM 10	-0.053040

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.020446
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-95.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.082376
SO _x	-0.031706
NO _x	-0.020742
CO	-1.928125
PM 10	-0.053040

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.020446
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-95.8

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 81
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2031 Removal 32 T-7A LFP
- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2031

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.090220
SO _x	-0.042527
NO _x	-0.651811
CO	-0.074322
PM 10	-0.005167

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.004372
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-128.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.090220
SO _x	-0.042527
NO _x	-0.651811
CO	-0.074322
PM 10	-0.005167

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.004372
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-128.5

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 32

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

18.4 Auxiliary Power Unit (APU)

18.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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18.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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18.4.3 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

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 addition 32 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2031

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.032543
SO _x	0.012526
NO _x	0.008194
CO	0.761729
PM 10	0.020954

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.008077
Pb	0.000000
NH ₃	0.000000
CO _{2e}	37.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.032543
SO _x	0.012526
NO _x	0.008194
CO	0.761729
PM 10	0.020954

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.008077
Pb	0.000000
NH ₃	0.000000
CO _{2e}	37.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 32
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions 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) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	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: Atascosa
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Addition 387 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.091100
SO _x	0.514307
NO _x	7.882839
CO	0.898836
PM 10	0.062486

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.052873
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1554.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.091100
SO _x	0.514307
NO _x	7.882839
CO	0.898836
PM 10	0.062486

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.052873
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1554.5

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 Emissions 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:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	387
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20.4 Auxiliary Power Unit (APU)

20.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

20.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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20.4.3 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. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Removal 387 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.393573
SO _x	-0.151483
NO _x	-0.099101
CO	-9.212154
PM 10	-0.253416

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.097685
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-457.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.393573
SO _x	-0.151483
NO _x	-0.099101
CO	-9.212154
PM 10	-0.253416

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.097685
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-457.8

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 387
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9

Military (mins): 9
AfterBurn (mins): 3

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

ALTERNATIVE 1

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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB
State: Texas
County(s): Atascosa; Llano; San Saba; McCulloch
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 1 (VR140, VR156, VR1120 and R6132 Range)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 4556 annual low flight patterns in the steady state year within this MOA, and spend a weighted average of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

Atascosa
Bandera
Bastrop
Bee
Blanco
Caldwell
Comal
De Witt
Dimmit
Frio
Gonzales
Hays
Jim Wells
Karnes
Kendall
Kendall
La Salle
Live Oak
McMullen
Uvalde
Webb
Zavala

All counties are in attainment for all NAAQS.

f. Point of Contact:

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

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

applicable
 not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance

indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.497	250	No
NOx	5.551	250	No
CO	-5.929	250	No
SOx	0.259	250	No
PM 10	-0.136	250	No
PM 2.5	-0.032	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	782.1		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.366	250	No
NOx	15.246	250	No
CO	-16.283	250	No
SOx	0.711	250	No
PM 10	-0.374	250	No
PM 2.5	-0.088	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	2147.9		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.222	250	No
NOx	36.119	250	No
CO	-38.250	250	No
SOx	1.705	250	No
PM 10	-0.882	250	No
PM 2.5	-0.207	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	5158.9		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	4.981	250	No
NO _x	55.750	250	No
CO	-59.216	250	No
SO _x	2.620	250	No
PM 10	-1.363	250	No
PM 2.5	-0.320	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	7924.5		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	7.550	250	No
NO _x	84.411	250	No
CO	-89.827	250	No
SO _x	3.956	250	No
PM 10	-2.066	250	No
PM 2.5	-0.485	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	11962.4		

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.212	250	No
NO _x	91.856	250	No
CO	-97.661	250	No
SO _x	4.311	250	No
PM 10	-2.247	250	No
PM 2.5	-0.527	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	13036.3		

2029 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.212	250	No
NO _x	91.856	250	No
CO	-97.661	250	No
SO _x	4.311	250	No
PM 10	-2.247	250	No
PM 2.5	-0.527	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	13036.3		

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

ALTERNATIVE 1

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 4556 annual low flight patterns in the steady state year within this MOA, and spend a weighted average of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

- Atascosa
- Bandera
- Bastrop
- Bee
- Blanco
- Caldwell
- Comal
- De Witt
- Dimmit
- Frio
- Gonzales
- Hays
- Jim Wells
- Karnes
- Kendall
- Kendall
- La Salle

Live Oak
 McMullen
 Uvalde
 Webb
 Zavala

All counties are in attainment for all NAAQS.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

	Activity Type	Activity Title
2.	Aircraft	2023 Additon of 276 T-7 LFP
3.	Aircraft	2023 Removal 276 T-38 LFP
4.	Aircraft	2024 Addition 482 LFP
5.	Aircraft	2024 Removal 482 T-38 LFP
6.	Aircraft	2025 Addition 1029 T-7 LFP
7.	Aircraft	2025 Removal 1029 T-38 LFP
8.	Aircraft	2026 Addition 976 T-7 LFP
9.	Aircraft	2026 Removal 976 T-38 LFP
10.	Aircraft	2027 Addition 1425 T-7 LFP
11.	Aircraft	2027 Removal 1425 T-38 LFP
12.	Aircraft	2028 Addition 367 T-7 LFP
13.	Aircraft	2028 Removal 367 T-38 LFP

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: Atascosa
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** 2023 Additon of 276 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.778149
SO _x	0.366793
NO _x	5.621870
CO	0.641030
PM 10	0.044564

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.037708
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1108.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.778149
SO _x	0.366793
NO _x	5.621870
CO	0.641030
PM 10	0.044564

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.037708
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1108.6

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 Emissions 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: 8
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 276
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

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

- Activity Title: 2023 Removal 276 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.280688
SO _x	-0.108034
NO _x	-0.070677
CO	-6.569908
PM 10	-0.180731

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.069667
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-326.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.280688
SO _x	-0.108034
NO _x	-0.070677
CO	-6.569908
PM 10	-0.180731

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.069667
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-326.5

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 10
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 276
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; San Saba; McCulloch

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Addition 482 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2024

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.358941
SO _x	0.640558
NO _x	9.817903
CO	1.119480
PM 10	0.077825

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.065852
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1936.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.358941
SO _x	0.640558
NO _x	9.817903
CO	1.119480
PM 10	0.077825

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.065852
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1936.0

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 Emissions 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: 10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 482
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

4.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for LTOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- **Aircraft Emissions for LTOs per Year**

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for TGOs per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Llano; McCulloch; San Saba
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2024 Removal 482 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2024
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.490186
SO _x	-0.188669
NO _x	-0.123428
CO	-11.473536
PM 10	-0.315624

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.121665
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-570.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.490186
SO _x	-0.188669
NO _x	-0.123428
CO	-11.473536
PM 10	-0.315624

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.121665
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-570.2

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 11
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 482
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AE_{PSIDLE} + AE_{PSAPPROACH} + AE_{PSINTERMEDIATE} + AE_{PSMILITARY} + AE_{PSAFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

AE_{PSIDLE} : Aircraft Emissions for Idle Power Setting (TONs)

$AE_{PSAPPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AE_{PSINTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AE_{PSMILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AE_{PSAFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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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5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 1029 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2025

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	2.902429
SO _x	1.397083
NO _x	21.137299
CO	2.527557
PM 10	0.166145

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.140584
Pb	0.000000
NH ₃	0.000000
CO _{2e}	4228.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.902429
SO _x	1.397083
NO _x	21.137299
CO	2.527557
PM 10	0.166145

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.140584
Pb	0.000000
NH ₃	0.000000
CO _{2e}	4228.4

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 Emissions 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: 7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1029

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4
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6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Removal 1029 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2025

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.046477
SO _x	-0.402781
NO _x	-0.263501
CO	-24.494332
PM 10	-0.673811

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.259737
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1217.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.046477
SO _x	-0.402781
NO _x	-0.263501
CO	-24.494332
PM 10	-0.673811

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.259737
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1217.4

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 7
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1029
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9

AfterBurn (mins): 3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Addition 976 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	2.751715
SO _x	1.297064
NO _x	19.880234
CO	2.266832
PM 10	0.157587

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.133343
Pb	0.000000
NH ₃	0.000000
CO _{2e}	3920.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.751715
SO _x	1.297064
NO _x	19.880234
CO	2.266832
PM 10	0.157587

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.133343
Pb	0.000000
NH ₃	0.000000
CO _{2e}	3920.3

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 Emissions 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:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	976
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 976 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.992577
SO _x	-0.382035
NO _x	-0.249929
CO	-23.232719
PM 10	-0.639105

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.246359
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1154.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.992577
SO _x	-0.382035
NO _x	-0.249929
CO	-23.232719

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.246359
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1154.7

PM 10	-0.639105
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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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 16
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 976
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27

Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 1425 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	4.017617
SO _x	1.893767
NO _x	29.025957
CO	3.309667
PM 10	0.230084

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.194686
Pb	0.000000
NH ₃	0.000000
CO _{2e}	5723.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.017617
SO _x	1.893767
NO _x	29.025957
CO	3.309667
PM 10	0.230084

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.194686
Pb	0.000000
NH ₃	0.000000
CO _{2e}	5723.8

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	19
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1425
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AETGO = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AETGO: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AETRIM = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AETRIM: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Removal 1425 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.449203
SO _x	-0.557787
NO _x	-0.364907
CO	-33.920723
PM 10	-0.933120

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.359694
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1685.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.449203
SO _x	-0.557787

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.359694
Pb	0.000000

NO _x	-0.364907
CO	-33.920723
PM 10	-0.933120

NH ₃	0.000000
CO _{2e}	-1685.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 21
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1425
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Llano; McCulloch; San Saba
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 367 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2028

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.035171
SO _x	0.498279
NO _x	7.538764
CO	0.901471
PM 10	0.059257

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.050140
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1508.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.035171
SO _x	0.498279
NO _x	7.538764
CO	0.901471
PM 10	0.059257

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.050140
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1508.1

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	367
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)

AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)

AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)

AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)

AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Llano; McCulloch; San Saba

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 367 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.373233
SO _x	-0.143655
NO _x	-0.093980
CO	-8.736074

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.092637
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-434.2

PM 10	-0.240319
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- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.373233
SO _x	-0.143655
NO _x	-0.093980
CO	-8.736074
PM 10	-0.240319

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.092637
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-434.2

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 367
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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

ALTERNATIVE 2

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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB
State: Texas
County(s): Atascosa
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 2 (VR140, VR156, VR1120 and R6132 Range)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 6717 annual low flight patterns in the steady state year within this MOA, and spend a weighted average of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

Atascosa
Bandera
Bastrop
Bee
Blanco
Caldwell
Comal
De Witt
Dimmit
Frio
Gonzales
Hays
Jim Wells
Karnes
Kendall
Kendall
La Salle
Live Oak
McMullen
Uvalde
Webb
Zavala

All counties are in attainment for all NAAQS.

f. Point of Contact:

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

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

applicable
 not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance

indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.427	250	No
NOx	4.767	250	No
CO	-5.091	250	No
SOx	0.222	250	No
PM 10	-0.117	250	No
PM 2.5	-0.027	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	671.6		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.350	250	No
NOx	15.065	250	No
CO	-16.090	250	No
SOx	0.702	250	No
PM 10	-0.370	250	No
PM 2.5	-0.087	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	2122.4		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.184	250	No
NOx	35.695	250	No
CO	-37.800	250	No
SOx	1.685	250	No
PM 10	-0.871	250	No
PM 2.5	-0.204	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	5098.3		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	4.922	250	No
NOx	55.084	250	No
CO	-58.508	250	No
SOx	2.589	250	No
PM 10	-1.347	250	No
PM 2.5	-0.316	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	7829.9		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.101	250	No
NOx	90.563	250	No
CO	-96.402	250	No
SOx	4.242	250	No
PM 10	-2.217	250	No
PM 2.5	-0.520	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	12828.4		

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.881	250	No
NOx	121.823	250	Yes
CO	-129.298	250	No
SOx	5.732	250	No
PM 10	-2.977	250	No
PM 2.5	-0.699	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	17337.6		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	11.207	250	No
NOx	125.464	250	Yes
CO	-133.187	250	No
SOx	5.901	250	No
PM 10	-3.067	250	No
PM 2.5	-0.720	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	17850.5		

2030

Pollutant		INSIGNIFICANCE INDICATOR	
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	Action Emissions (ton/yr)	Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	11.376	250	No
NO _x	127.371	250	Yes
CO	-135.193	250	No
SO _x	5.992	250	No
PM 10	-3.113	250	No
PM 2.5	-0.731	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	18125.6		

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	11.283	250	No
NO _x	126.620	250	Yes
CO	-135.031	250	No
SO _x	5.947	250	No
PM 10	-3.112	250	No
PM 2.5	-0.733	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	17989.3		

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	12.085	250	No
NO _x	135.570	250	Yes
CO	-144.590	250	No
SO _x	6.364	250	No
PM 10	-3.332	250	No
PM 2.5	-0.785	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	19250.3		

2033 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	12.085	250	No
NO _x	135.570	250	Yes
CO	-144.590	250	No
SO _x	6.364	250	No
PM 10	-3.332	250	No
PM 2.5	-0.785	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	19250.3		

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.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

ALTERNATIVE 2

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: RANDOLPH AFB
State: Texas
County(s): Atascosa
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 2 (VR140, VR156, VR1120 and R6132 Range)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2023

- Action Purpose and Need:

The T 38 Talon is a twin-engine, high-altitude, supersonic jet used by the USAF and other nations for pilot training. The aircraft originally was developed in the 1950s with production occurring between 1961 and 1972. The fleet has undergone periodic upgrades overtime. In 2001, the USAF upgraded several hundred T 38s with modern avionics and replaced propulsion components to provide increased performance and superior reliability.

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 6717 annual low flight patterns in the

steady state year within this MOA, and spend a weighted average of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

- Atascosa
- Bandera
- Bastrop
- Bee
- Blanco
- Caldwell
- Comal
- De Witt
- Dimmit
- Frio
- Gonzales
- Hays
- Jim Wells
- Karnes
- Kendall
- Kendall
- La Salle
- Live Oak
- McMullen
- Uvalde
- Webb
- Zavala

All counties are in attainment for all NAAQS.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2023 Additon of 237 T-7 LFP
3.	Aircraft	2023 Removal 237 T-38 LFP
4.	Aircraft	2024 Addition 512 LFP
5.	Aircraft	2024 Removal 512 T-38 LFP
6.	Aircraft	2025 Addition 1017 T-7 LFP
7.	Aircraft	2025 Removal 1017 T-38 LFP
8.	Aircraft	2026 Addition 964 T-7 LFP
9.	Aircraft	2026 Removal 964 T-38 LFP
10.	Aircraft	2027 Addition 1764 T-7 LFP
11.	Aircraft	2027 Removal 1764 T-38 LFP
12.	Aircraft	2028 Addition 1541 T-7 LFP
13.	Aircraft	2028 Removal 1541 T-38 LFP
14.	Aircraft	2029 Addition 181 T-7 LFP
15.	Aircraft	2029 Remove 181 T-38 LFP
16.	Aircraft	2030 Addition 94 T-7 LFP
17.	Aircraft	2030 Removal 94 T-38 LFP
18.	Aircraft	2031 Removal 37 T-7A LFP

19.	Aircraft	2031 addition 37 T-38 LFP
20.	Aircraft	2032 Addition 445 T-7 LFP
21.	Aircraft	2032 Removal 445 T-38 LFP

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: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Additon of 237 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.668193
SO _x	0.314963
NO _x	4.827475
CO	0.550450
PM 10	0.038267

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032379
Pb	0.000000
NH ₃	0.000000
CO _{2e}	952.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.668193
SO _x	0.314963
NO _x	4.827475
CO	0.550450
PM 10	0.038267

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032379
Pb	0.000000
NH ₃	0.000000
CO _{2e}	952.0

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 Emissions 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: 8
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 237
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Removal 237 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.241025
SO _x	-0.092769
NO _x	-0.060690
CO	-5.641552
PM 10	-0.155193

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.059823
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-280.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.241025
SO _x	-0.092769
NO _x	-0.060690
CO	-5.641552
PM 10	-0.155193

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.059823
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-280.4

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 10
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 237
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0

Number of Annual Trim Test(s) per Aircraft:

0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

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

- Activity Title: 2024 Addition 512 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2024

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.443523
SO _x	0.680427
NO _x	10.428975
CO	1.189158
PM 10	0.082669

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.069950
Pb	0.000000
NH ₃	0.000000
CO _{2e}	2056.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.443523
SO _x	0.680427
NO _x	10.428975
CO	1.189158
PM 10	0.082669

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.069950
Pb	0.000000
NH ₃	0.000000
CO _{2e}	2056.5

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 Emissions 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: 10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 512
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Removal 512 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2024

- Activity End Date
 Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.520696
SO _x	-0.200412
NO _x	-0.131110
CO	-12.187656
PM 10	-0.335268

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.129237
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-605.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.520696
SO _x	-0.200412
NO _x	-0.131110
CO	-12.187656
PM 10	-0.335268

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.129237
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-605.7

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	11
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	512
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)

60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 1017 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2025

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	2.868581
SO _x	1.380790
NO _x	20.890800
CO	2.498081
PM 10	0.164207

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.138945
Pb	0.000000
NH ₃	0.000000
CO _{2e}	4179.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.868581
SO _x	1.380790
NO _x	20.890800
CO	2.498081
PM 10	0.164207

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.138945
Pb	0.000000
NH ₃	0.000000
CO _{2e}	4179.1

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 Emissions 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: 7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1017
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

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

- Activity Title: 2025 Removal 1017 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2025

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.034273
SO _x	-0.398083
NO _x	-0.260428
CO	-24.208684
PM 10	-0.665953

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.256708
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1203.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.034273
SO _x	-0.398083
NO _x	-0.260428
CO	-24.208684
PM 10	-0.665953

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.256708
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1203.2

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1017
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Addition 964 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	2.717883
SO _x	1.281117
NO _x	19.635805
CO	2.238961
PM 10	0.155650

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.131704
Pb	0.000000
NH ₃	0.000000
CO _{2e}	3872.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.717883

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.131704

SO _x	1.281117
NO _x	19.635805
CO	2.238961
PM 10	0.155650

Pb	0.000000
NH ₃	0.000000
CO _{2e}	3872.1

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 Emissions 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: 14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 964
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9

Military (mins): 9
AfterBurn (mins): 3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 964 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.980373
SO _x	-0.377338
NO _x	-0.246856
CO	-22.947071
PM 10	-0.631247

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.243330
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1140.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.980373
SO _x	-0.377338
NO _x	-0.246856
CO	-22.947071
PM 10	-0.631247

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.243330
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1140.5

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234

Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	16
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	964
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 1764 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	4.973387
SO _x	2.344284
NO _x	35.931079
CO	4.097019
PM 10	0.284820

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.241001
Pb	0.000000
NH ₃	0.000000
CO _{2e}	7085.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.973387
SO _x	2.344284
NO _x	35.931079
CO	4.097019
PM 10	0.284820

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.241001
Pb	0.000000
NH ₃	0.000000
CO _{2e}	7085.4

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 19
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1764
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

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

- Activity Title: 2027 Removal 1764 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.793960
SO _x	-0.690481
NO _x	-0.451717
CO	-41.990284
PM 10	-1.155104

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.445263
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-2086.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.793960
SO _x	-0.690481
NO _x	-0.451717
CO	-41.990284
PM 10	-1.155104

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.445263
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-2086.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}

Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	21
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1764
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 1541 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	4.346592
SO _x	2.092230
NO _x	31.654594

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.210534
Pb	0.000000
NH ₃	0.000000

CO	3.785194
PM 10	0.248813

CO _{2e}	6332.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.346592
SO _x	2.092230
NO _x	31.654594
CO	3.785194
PM 10	0.248813

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.210534
Pb	0.000000
NH ₃	0.000000
CO _{2e}	6332.3

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1541
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 1541 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.567173
SO _x	-0.603192
NO _x	-0.394612
CO	-36.681988
PM 10	-1.009079

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.388975
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1823.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.567173
SO _x	-0.603192
NO _x	-0.394612
CO	-36.681988
PM 10	-1.009079

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.388975
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1823.1

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1541
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2029 Addition 181 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2029

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.510308
SO _x	0.240542
NO _x	3.686806
CO	0.420386
PM 10	0.029225

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.024729
Pb	0.000000
NH ₃	0.000000
CO _{2e}	727.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.510308
SO _x	0.240542
NO _x	3.686806
CO	0.420386
PM 10	0.029225

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.024729
Pb	0.000000
NH ₃	0.000000
CO _{2e}	727.0

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 Emissions 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: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 181
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

14.4 Auxiliary Power Unit (APU)

14.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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14.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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14.4.3 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

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2029 Remove 181 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2029
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.184074
SO _x	-0.070849
NO _x	-0.046350
CO	-4.308527
PM 10	-0.118523

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.045687
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-214.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.184074
SO _x	-0.070849
NO _x	-0.046350
CO	-4.308527
PM 10	-0.118523

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.045687
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-214.1

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft: 6
 - Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 181
 - Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 - Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi/Idle Out [Idle] (mins): 0
 - Takeoff [Military] (mins): 0
 - Takeoff [After Burn] (mins): 0
 - Climb Out [Intermediate] (mins): 21.31
 - Approach [Approach] (mins): 0
 - Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins): 12
 - Approach (mins): 27
 - Intermediate (mins): 9
 - Military (mins): 9
 - AfterBurn (mins): 3

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15.4 Auxiliary Power Unit (APU)

15.4.1 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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15.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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15.4.3 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

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Addition 94 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date
 Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.265139
SO _x	0.127625
NO _x	1.930910
CO	0.230894
PM 10	0.015177

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.012842
Pb	0.000000
NH ₃	0.000000
CO _{2e}	386.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.265139
SO _x	0.127625
NO _x	1.930910
CO	0.230894
PM 10	0.015177

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.012842
Pb	0.000000
NH ₃	0.000000
CO _{2e}	386.3

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 Emissions 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: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 94
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16.4 Auxiliary Power Unit (APU)

16.4.1 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

16.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

16.4.3 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. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2030 Removal 94 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2030
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.095597
SO _x	-0.036794
NO _x	-0.024071
CO	-2.237577
PM 10	-0.061553

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.023727
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-111.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.095597
SO _x	-0.036794
NO _x	-0.024071
CO	-2.237577
PM 10	-0.061553

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.023727
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-111.2

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 94
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2031 Removal 37 T-7A LFP
- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2031

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.104317
SO _x	-0.049171
NO _x	-0.753656
CO	-0.085935
PM 10	-0.005974

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.005055
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-148.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.104317
SO _x	-0.049171
NO _x	-0.753656
CO	-0.085935
PM 10	-0.005974

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.005055
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-148.6

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 37

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

18.4 Auxiliary Power Unit (APU)

18.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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18.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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18.4.3 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

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 addition 37 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2031

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.010595
SO _x	0.004078
NO _x	0.002668
CO	0.247982
PM 10	0.006822

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002630
Pb	0.000000
NH ₃	0.000000
CO _{2e}	12.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.010595
SO _x	0.004078
NO _x	0.002668
CO	0.247982
PM 10	0.006822

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.002630
Pb	0.000000
NH ₃	0.000000
CO _{2e}	12.3

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 37
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 6
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions 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) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	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: Atascosa
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Addition 445 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.254624
SO _x	0.591387
NO _x	9.064246
CO	1.033545
PM 10	0.071851

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.060797
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1787.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.254624
SO _x	0.591387
NO _x	9.064246
CO	1.033545
PM 10	0.071851

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.060797
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1787.4

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 Emissions 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:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	445
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20.4 Auxiliary Power Unit (APU)

20.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

20.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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20.4.3 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. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Removal 445 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.452558
SO _x	-0.174186
NO _x	-0.113953
CO	-10.592787
PM 10	-0.291395

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.112326
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-526.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.452558
SO _x	-0.174186
NO _x	-0.113953
CO	-10.592787
PM 10	-0.291395

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.112326
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-526.5

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 445
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9

Military (mins): 9
AfterBurn (mins): 3

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

ALTERNATIVE 3

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 an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: RANDOLPH AFB
State: Texas
County(s): Atascosa
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 3 (VR140, VR156, VR1120 and R6132 Range)

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2023

e. Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 7300 annual low flight patterns in the steady state year within this MOA, and spend a weighted average time of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

Atascosa
Bandera
Bastrop
Bee
Blanco
Caldwell
Comal
De Witt
Dimmit
Frio
Gonzales
Hays
Jim Wells
Karnes
Kendall
Kendall
La Salle
Live Oak
McMullen
Uvalde
Webb
Zavala

All counties are in attainment for all NAAQS.

f. Point of Contact:

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

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

applicable
 not applicable

Total 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” (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used 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 potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are “Clearly Attainment” (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are “Near Nonattainment” (i.e., within 5% of any 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 pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance

indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2023

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.427	250	No
NOx	4.767	250	No
CO	-5.091	250	No
SOx	0.222	250	No
PM 10	-0.117	250	No
PM 2.5	-0.027	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	671.6		

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.467	250	No
NOx	16.372	250	No
CO	-17.486	250	No
SOx	0.763	250	No
PM 10	-0.402	250	No
PM 2.5	-0.094	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	2306.6		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.460	250	No
NOx	38.787	250	No
CO	-41.075	250	No
SOx	1.831	250	No
PM 10	-0.947	250	No
PM 2.5	-0.222	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	5540.0		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			

VOC	5.349	250	No
NO _x	59.866	250	No
CO	-63.588	250	No
SO _x	2.813	250	No
PM 10	-1.464	250	No
PM 2.5	-0.344	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	8509.6		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.804	250	No
NO _x	98.423	250	No
CO	-104.768	250	No
SO _x	4.611	250	No
PM 10	-2.410	250	No
PM 2.5	-0.566	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	13941.7		

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	11.825	250	No
NO _x	132.401	250	Yes
CO	-140.525	250	No
SO _x	6.229	250	No
PM 10	-3.236	250	No
PM 2.5	-0.759	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	18843.0		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	12.180	250	No
NO _x	136.363	250	Yes
CO	-144.757	250	No
SO _x	6.414	250	No
PM 10	-3.333	250	No
PM 2.5	-0.782	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	19401.2		

2030

Pollutant		INSIGNIFICANCE INDICATOR	
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	Action Emissions (ton/yr)	Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	12.364	250	No
NO _x	138.432	250	Yes
CO	-146.934	250	No
SO _x	6.512	250	No
PM 10	-3.383	250	No
PM 2.5	-0.794	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	19699.7		

2031

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	12.292	250	No
NO _x	137.628	250	Yes
CO	-146.075	250	No
SO _x	6.475	250	No
PM 10	-3.364	250	No
PM 2.5	-0.789	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	19586.4		

2032

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	13.165	250	No
NO _x	147.362	250	Yes
CO	-156.472	250	No
SO _x	6.929	250	No
PM 10	-3.603	250	No
PM 2.5	-0.846	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	20957.8		

2033 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	13.165	250	No
NO _x	147.362	250	Yes
CO	-156.472	250	No
SO _x	6.929	250	No
PM 10	-3.603	250	No
PM 2.5	-0.846	250	No
Pb	0.000	25	No
NH ₃	0.000	250	No
CO _{2e}	20957.8		

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.

AFCEC/CZTQ , USAF Air Quality Technical Authority

DATE

ALTERNATIVE 3

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: RANDOLPH AFB
State: Texas
County(s): Atascosa
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Recapitalization of the T-7A Trainer At Randolph AFB - Alternative 3 (VR140, VR156, VR1120 and R6132 Range)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2023

- Action Purpose and Need:

The T 38 Talon is a twin-engine, high-altitude, supersonic jet used by the USAF and other nations for pilot training. The aircraft originally was developed in the 1950s with production occurring between 1961 and 1972. The fleet has undergone periodic upgrades overtime. In 2001, the USAF upgraded several hundred T 38s with modern avionics and replaced propulsion components to provide increased performance and superior reliability.

The purpose of the Proposed Action is to allow the USAF T-7A to provide more efficient and effective pilot training to establish a T-7A pilot pipeline to allow for the transition to T-7A training throughout the entire USAF.

- Action Description:

The proposed action encompasses the recapitalize of the T-38 flight-training program with newer and more capable T-7A aircraft at JBSA-Randolph and Lackland. In addition to the phased introduction of the T-7A aircraft, five military construction projects and 17 facilities sustainment, restoration, and modernization projects are proposed at JBSA-Randolph at JBSA-Lackland to provide modern facilities and infrastructure to support the T-7A aircraft's maintenance, training, and operational requirements. The number of personnel on JBSA-Randolph would increase due to the proposed aircraft recapitalization. No changes to airspace configurations (i.e., size, shape, or location) would be required to support the proposed operations of the T-7A aircraft; however, the T-7A aircraft may have more flight operations than occurs with the T 38C aircraft at both JBSA-Randolph and JBSA-Lackland. This Applicability Analysis present the worst-case of three aircraft operational intensities as the worst-case action alternatives for the Proposed Action.

A Conformity Evaluation is required for every proposed action that will occur within an area designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS). The proposed T-7A Recapitalization action will occur at both JBSA-Randolph AFB and JBSA-Lackland AFB which both fall entirely within Bexar County that has been designated by the U.S. Environmental Protection Agency (EPA) as a marginal nonattainment area for the 2015 Ozone NAAQS in 2018. Given this recent designation of Bexar County, the proposed action (as well as all proposed actions from federal agencies) are subject to the General Conformity Rule (GCR, 40 CFR 93 Subpart B). As a marginal nonattainment area for ozone, the GCR has established de minimis significance threshold values of less than 100 ton/yr (for any given year) for both nitrogen oxides (NO_x) and volatile organic compounds (VOC). The Conformity Evaluation was completed for Bexar County as required.

This Analysis accounts for the emissions generated from the aircraft recapitalization within the referenced MTRs and R6132 Range. As provided by the noise data, aircraft will fly 7300 annual low flight patterns in the

steady state year within this MOA, and spend a weighted average time of 21.31 minutes below 3,000 ft AGL for each low flight pattern. The time below 3,000 ft AGL will be spent in the Climbout (intermediate) power setting.

The counties include:

- Atascosa
- Bandera
- Bastrop
- Bee
- Blanco
- Caldwell
- Comal
- De Witt
- Dimmit
- Frio
- Gonzales
- Hays
- Jim Wells
- Karnes
- Kendall
- Kendall
- La Salle
- Live Oak
- McMullen
- Uvalde
- Webb
- Zavala

All counties are in attainment for all NAAQS.

- Point of Contact

Name: AFCEC/CZTQ
Title: USAF Air Quality Technical Authority
Organization: AFCEC/CZ
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	2023 Additon of 237 T-7 LFP
3.	Aircraft	2023 Removal 237 T-38 LFP
4.	Aircraft	2024 Addition 577 LFP
5.	Aircraft	2024 Removal 577 T-38 LFP
6.	Aircraft	2025 Addition 1105 T-7 LFP
7.	Aircraft	2025 Removal 1105 T-38 LFP
8.	Aircraft	2026 Addition 1048 T-7 LFP
9.	Aircraft	2026 Removal 1048 T-38 LFP
10.	Aircraft	2027 Addition 1917 T-7 LFP
11.	Aircraft	2027 Removal 1917 T-38 LFP
12.	Aircraft	2028 Addition 1675 T-7 LFP
13.	Aircraft	2028 Removal 1675 T-38 LFP
14.	Aircraft	2029 Addition 197 T-7 LFP
15.	Aircraft	2029 Remove 197 T-38 LFP
16.	Aircraft	2030 Addition 102 T-7 LFP
17.	Aircraft	2030 Removal 102 T-38 LFP
18.	Aircraft	2031 Removal 40 T-7A LFP

19.	Aircraft	2031 addition 40 T-38 LFP
20.	Aircraft	2032 Addition 484 T-7 LFP
21.	Aircraft	2032 Removal 484 T-38 LFP

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: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Additon of 237 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.668193
SO _x	0.314963
NO _x	4.827475
CO	0.550450
PM 10	0.038267

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032379
Pb	0.000000
NH ₃	0.000000
CO _{2e}	952.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.668193
SO _x	0.314963
NO _x	4.827475
CO	0.550450
PM 10	0.038267

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.032379
Pb	0.000000
NH ₃	0.000000
CO _{2e}	952.0

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 Emissions 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: 8
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 237
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
 $AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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2.4.3 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

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2023 Removal 237 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2023

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.241025
SO _x	-0.092769
NO _x	-0.060690
CO	-5.641552
PM 10	-0.155193

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.059823
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-280.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.241025
SO _x	-0.092769
NO _x	-0.060690
CO	-5.641552
PM 10	-0.155193

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.059823
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-280.4

3.2 Aircraft & Engines

3.2.1 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:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 10
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 237
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0

Number of Annual Trim Test(s) per Aircraft:

0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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3.4.3 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

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

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

- Activity Title: 2024 Addition 577 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2024

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.626783
SO _x	0.766809
NO _x	11.752966
CO	1.340125
PM 10	0.093164

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.078831
Pb	0.000000
NH ₃	0.000000
CO _{2e}	2317.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.626783
SO _x	0.766809
NO _x	11.752966
CO	1.340125
PM 10	0.093164

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.078831
Pb	0.000000
NH ₃	0.000000
CO _{2e}	2317.6

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 Emissions 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:	10
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	577
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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4.4.3 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2024 Removal 577 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
 Start Year: 2024

- Activity End Date
 Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.586800
SO _x	-0.225855
NO _x	-0.147755
CO	-13.734917
PM 10	-0.377832

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.145645
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-682.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.586800
SO _x	-0.225855
NO _x	-0.147755
CO	-13.734917
PM 10	-0.377832

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.145645
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-682.6

5.2 Aircraft & Engines

5.2.1 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:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	11
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	577
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)

- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 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

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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5.4.3 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

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2025 Addition 1105 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2025

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	3.116797
SO _x	1.500269
NO _x	22.698460
CO	2.714237
PM 10	0.178416

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.150967
Pb	0.000000
NH ₃	0.000000
CO _{2e}	4540.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	3.116797
SO _x	1.500269
NO _x	22.698460
CO	2.714237
PM 10	0.178416

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.150967
Pb	0.000000
NH ₃	0.000000
CO _{2e}	4540.7

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 Emissions 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: 7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1105
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 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

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

6.4.3 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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

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

- Activity Title: 2025 Removal 1105 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2025

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.123768
SO _x	-0.432529
NO _x	-0.282963
CO	-26.303438
PM 10	-0.723577

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.278921
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1307.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.123768
SO _x	-0.432529
NO _x	-0.282963
CO	-26.303438
PM 10	-0.723577

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.278921
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1307.3

7.2 Aircraft & Engines

7.2.1 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:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	7
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1105
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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7.4.3 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

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Addition 1048 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	2.954711
SO _x	1.392749
NO _x	21.346809
CO	2.434057
PM 10	0.169213

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.143180
Pb	0.000000
NH ₃	0.000000
CO _{2e}	4209.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	2.954711

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.143180

SO _x	1.392749
NO _x	21.346809
CO	2.434057
PM 10	0.169213

Pb	0.000000
NH ₃	0.000000
CO _{2e}	4209.5

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 Emissions 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: 14
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1048
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9

Military (mins): 9
AfterBurn (mins): 3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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8.4.3 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

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2026 Removal 1048 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.065799
SO _x	-0.410218
NO _x	-0.268367
CO	-24.946609
PM 10	-0.686252

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.264533
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1239.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.065799
SO _x	-0.410218
NO _x	-0.268367
CO	-24.946609
PM 10	-0.686252

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.264533
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1239.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234

Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	16
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1048
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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9.4.3 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

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2027 Addition 1917 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2027

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	5.404752
SO _x	2.547615
NO _x	39.047550
CO	4.452373
PM 10	0.309523

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.261904
Pb	0.000000
NH ₃	0.000000
CO _{2e}	7700.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	5.404752
SO _x	2.547615
NO _x	39.047550
CO	4.452373
PM 10	0.309523

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.261904
Pb	0.000000
NH ₃	0.000000
CO _{2e}	7700.0

10.2 Aircraft & Engines

10.2.1 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:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 19
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1917
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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10.4.3 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

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

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

- Activity Title: 2027 Removal 1917 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2027

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.949559
SO _x	-0.750370
NO _x	-0.490896
CO	-45.632298
PM 10	-1.255291

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.483883
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-2267.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.949559
SO _x	-0.750370
NO _x	-0.490896
CO	-45.632298
PM 10	-1.255291

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.483883
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-2267.9

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}

Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	21
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1917
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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11.4.3 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

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Addition 1675 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	4.724556
SO _x	2.274163
NO _x	34.407167

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.228842
Pb	0.000000
NH ₃	0.000000

CO	4.114342
PM 10	0.270449

CO _{2e}	6883.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	4.724556
SO _x	2.274163
NO _x	34.407167
CO	4.114342
PM 10	0.270449

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.228842
Pb	0.000000
NH ₃	0.000000
CO _{2e}	6883.0

12.2 Aircraft & Engines

12.2.1 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:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1675
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- LTO: Number of Landing and Take-off Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{LTO}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- TGO: Number of Touch-and-Go Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 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

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

12.4.3 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

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2028 Removal 1675 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2028

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.703449
SO _x	-0.655644
NO _x	-0.428926
CO	-39.871727
PM 10	-1.096825

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.422798
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1981.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.703449
SO _x	-0.655644
NO _x	-0.428926
CO	-39.871727
PM 10	-1.096825

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.422798
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-1981.6

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 3
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1675
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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13.4.3 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

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2029 Addition 197 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2029

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.555418
SO _x	0.261805
NO _x	4.012711
CO	0.457547
PM 10	0.031808

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.026915
Pb	0.000000
NH ₃	0.000000
CO _{2e}	791.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.555418
SO _x	0.261805
NO _x	4.012711
CO	0.457547
PM 10	0.031808

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.026915
Pb	0.000000
NH ₃	0.000000
CO _{2e}	791.3

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 Emissions 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: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 197
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

14.4 Auxiliary Power Unit (APU)

14.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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14.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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14.4.3 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

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2029 Remove 197 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2029
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.200346
SO _x	-0.077112
NO _x	-0.050447
CO	-4.689391
PM 10	-0.129000

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.049726
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-233.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.200346
SO _x	-0.077112
NO _x	-0.050447
CO	-4.689391
PM 10	-0.129000

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.049726
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-233.1

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations
 - Number of Aircraft: 6
 - Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 197
 - Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 - Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 - Taxi/Idle Out [Idle] (mins): 0
 - Takeoff [Military] (mins): 0
 - Takeoff [After Burn] (mins): 0
 - Climb Out [Intermediate] (mins): 21.31
 - Approach [Approach] (mins): 0
 - Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 - Idle (mins): 12
 - Approach (mins): 27
 - Intermediate (mins): 9
 - Military (mins): 9
 - AfterBurn (mins): 3

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO} : Aircraft Emissions (TONs)
 AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL} : Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

15.4 Auxiliary Power Unit (APU)

15.4.1 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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15.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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15.4.3 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

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2030 Addition 102 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2030

- Activity End Date
 Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.287704
SO _x	0.138486
NO _x	2.095242
CO	0.250545
PM 10	0.016469

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.013935
Pb	0.000000
NH ₃	0.000000
CO _{2e}	419.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.287704
SO _x	0.138486
NO _x	2.095242
CO	0.250545
PM 10	0.016469

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.013935
Pb	0.000000
NH ₃	0.000000
CO _{2e}	419.1

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 Emissions 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: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 102
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)	
Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test	
Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 LTO: Number of Landing and Take-off Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
 AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
 AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
 AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
 AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
 AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
 TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{TGO}: Aircraft Emissions (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

16.4 Auxiliary Power Unit (APU)

16.4.1 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

16.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
4501687C	211.0	0.010	0.230	1.380	1.070	-1.000	-1.000	740.4

16.4.3 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. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2030 Removal 102 T-38 LFP
- Activity Description:
- Activity Start Date
 - Start Month: 1
 - Start Year: 2030
- Activity End Date
 - Indefinite: Yes
 - End Month: N/A
 - End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.103732
SO _x	-0.039926
NO _x	-0.026120
CO	-2.428010
PM 10	-0.066792

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.025747
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-120.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.103732
SO _x	-0.039926
NO _x	-0.026120
CO	-2.428010
PM 10	-0.066792

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.025747
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-120.7

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations
 Number of Aircraft: 14
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 102
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
 Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
 Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove
- Activity Location
 - County: Atascosa
 - Regulatory Area(s): NOT IN A REGULATORY AREA
- Activity Title: 2031 Removal 40 T-7A LFP
- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2031

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.112775
SO _x	-0.053158
NO _x	-0.814764
CO	-0.092903
PM 10	-0.006458

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.005465
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-160.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.112775
SO _x	-0.053158
NO _x	-0.814764
CO	-0.092903
PM 10	-0.006458

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.005465
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-160.7

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 Emissions 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: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 40

Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

18.4 Auxiliary Power Unit (APU)

18.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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18.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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18.4.3 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

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2031 addition 40 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2031

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.040679
SO _x	0.015657
NO _x	0.010243
CO	0.952161
PM 10	0.026193

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.010097
Pb	0.000000
NH ₃	0.000000
CO _{2e}	47.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.040679
SO _x	0.015657
NO _x	0.010243
CO	0.952161
PM 10	0.026193

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.010097
Pb	0.000000
NH ₃	0.000000
CO _{2e}	47.3

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 0
 Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 40
 Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
 Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
 Takeoff [Military] (mins): 0
 Takeoff [After Burn] (mins): 0
 Climb Out [Intermediate] (mins): 21.31
 Approach [Approach] (mins): 0
 Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
 Approach (mins): 27
 Intermediate (mins): 9
 Military (mins): 9
 AfterBurn (mins): 3

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions 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) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	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: Atascosa
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Addition 484 T-7 LFP

- Activity Description:

- Activity Start Date

Start Month: 1
Start Year: 2032

- Activity End Date

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	1.364580
SO _x	0.643216
NO _x	9.858641
CO	1.124126
PM 10	0.078148

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.066125
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1944.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	1.364580
SO _x	0.643216
NO _x	9.858641
CO	1.124126
PM 10	0.078148

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.066125
Pb	0.000000
NH ₃	0.000000
CO _{2e}	1944.1

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 Emissions 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:	0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	484
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	21.31
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 TGO: Number of Touch-and-Go Cycles (for all aircraft)
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO} : Aircraft Emissions (TONs)
 $AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
 $AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
 $AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
 TD: Test Duration (min)
 60: Conversion Factor minutes to hours
 FC: Fuel Flow Rate (lb/hr)
 1000: Conversion Factor pounds to 1000pounds
 EF: Emission Factor (lb/1000lb fuel)
 NE: Number of Engines
 NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)
 $AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
 $AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
 $AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
 $AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
 $AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20.4 Auxiliary Power Unit (APU)

20.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

20.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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20.4.3 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. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location

County: Atascosa

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2032 Removal 484 T-38 LFP

- Activity Description:

- Activity Start Date

Start Month: 1

Start Year: 2032

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.492220
SO _x	-0.189452
NO _x	-0.123940
CO	-11.521144
PM 10	-0.316933

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.122170
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-572.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.492220
SO _x	-0.189452
NO _x	-0.123940
CO	-11.521144
PM 10	-0.316933

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.122170
Pb	0.000000
NH ₃	0.000000
CO _{2e}	-572.6

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 Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
Idle	520.00	16.80	1.07	1.08	177.45	4.70	4.02	3234
Approach	854.00	7.84	1.07	0.84	106.29	2.80	1.85	3234
Intermediate	1030.00	2.78	1.07	0.70	65.07	1.79	0.69	3234
Military	2220.00	0.75	1.07	1.92	30.99	1.13	0.04	3234
After Burn	7695.00	6.97	1.07	6.23	53.43	0.25	0.09	3234

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 0
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 484
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 21.31
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the default values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9

Military (mins): 9
AfterBurn (mins): 3

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for LTOs per Year

$$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONS

- Aircraft Emissions for TGOs per Year

$$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{TGO}: Aircraft Emissions (TONs)
AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions 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: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
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21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CO _{2e}
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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