MOB6

KC-46A MAIN OPERATING BASE NO.6 BEDDOWN

Final

Environmental Impact Statement (EIS)
KC-46A Main Operating Base #6 (MOB 6) Beddown
*Volume II – Appendices (Appendix B)*

November 2023

HEADQUARTERS AIR MOBILITY COMMAND

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Appendix B: Air Quality Analysis Supporting Documentation

The emission factors presented in this appendix are imbedded within the United States Department of the Air Force (DAF) Air Conformity Applicability Model (ACAM) and come from the following DAF documents: (1) *Air Emissions Guide for Air Force Stationary Sources, Methods for Estimating Emissions of Air Pollutants for Stationary Sources at U.S. Air Force Installations, Air Force Civil Engineer Center* (June 2020), and (2) *Air Emissions Guide for Air Force Mobile Sources, Methods for Estimating Emissions of Air Pollutants for Mobile Sources at U.S. Air Force Installations, Air Force Civil Engineering Center* (June 2020).

The following on-road vehicle type abbreviations and their definitions are used throughout this appendix.

LDGV: Light-Duty Gasoline Vehicle (Passenger Cars)
LDGT: Light-Duty Gasoline Truck (0–8,500 Pounds Gross Vehicle Weight Rating [GVWR])
HDGV: Heavy-Duty Gasoline Vehicle (8,501 to > 60,000 Pounds GVWR)
LDDV: Light-Duty Diesel Vehicle (Passenger Cars)
LDDT: Light-Duty Diesel Truck (0–8,500 Pounds GVWR)
HDDV: Heavy-Duty Diesel Vehicle (8,501 to > 60,000 Pounds GVWR)
MC: Motorcycles (Gasoline)

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B.1   Alternative 1 – ACAM Report Record of Air Analysis (ROAA)

1. General Information: The DAF's ACAM was used to perform an analysis to assess the potential air quality impacts associated with the action in accordance with 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: MACDILL AFB
    State: Florida
    County(s):   Hillsborough
    Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: KC-46A Main Operating Base #6 Beddown

c. Project Number/s (if applicable):   Alternative 1: KC-46A Beddown at MacDill AFB, Florida

d. Projected Action Start Date: 10/2025

e. Action Description:

    Alternative 1 would base 24 KC-46A aircraft in two squadrons of 12 PAA at MacDill AFB as an active duty, Continental United States location for the KC-46A MOB 6 beddown. The KC-46A beddown would occur in two stages: beddown and operational. The beddown stage would involve construction/retrofit of required facilities, infrastructure, and prepared surfaces, which includes renovation, alteration, and demolition. The beddown stage would also include preparing support facilities for new personnel and students to support the mission. The operational stage would involve conducting day-to-day activities (e.g., operational missions, maintenance) at the installation, including flight operations and training in the existing regional airspace.

f. Point of Contact:
    Name: Carolyn Hein
    Title: Contractor
    Organization: HDR
    Email:
    Phone Number: (484) 612-1100

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 DAF'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*.

"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/year Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5 percent of any NAAQS), and the GCR *de minimis* values (25 ton/year for lead and 100 ton/year for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5 percent 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:

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.441	250	No
NOx	2.350	250	No
CO	3.528	250	No
SOx	0.008	250	No
PM 10	41.342	250	No
PM 2.5	0.090	250	No
Pb	0.000	25	No
NH3	0.002	250	No
CO2e	789.5		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.058	250	No
NOx	5.924	250	No
CO	8.660	250	No
SOx	0.018	250	No
PM 10	13.732	250	No
PM 2.5	0.233	250	No
Pb	0.000	25	No
NH3	0.007	250	No
CO2e	1772.9		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.018	250	No
NOx	5.744	250	No
CO	8.325	250	No
SOx	0.017	250	No
PM 10	0.228	250	No
PM 2.5	0.227	250	No
Pb	0.000	25	No
NH3	0.006	250	No
CO2e	1691.6		
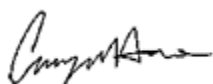
2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	12.297	250	No
NOx	39.685	250	No
CO	6.441	250	No
SOx	1.038	250	No
PM 10	-1.698	250	No
PM 2.5	-0.601	250	No
Pb	0.000	25	No
NH3	0.013	250	No
CO2e	4456.8		

2029 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	10.418	250	No
NOx	141.510	250	No
CO	0.768	250	No
SOx	4.101	250	No
PM 10	-7.478	250	No
PM 2.5	-3.085	250	No
Pb	0.000	25	No
NH3	0.032	250	No
CO2e	12750.5		

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 would not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

_____   ___10/27/2022___
Carolyn Hein, Contractor

B.2 Alternative 1 – Detail ACAM Report for the Beddown of 24 KC-46A PAA at MacDill AFB

B.2.1 General Information

- Action Location
   Base: MACDILL AFB
   State: Florida
   County(s): Hillsborough
   Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: KC-46A Main Operating Base #6 Beddown

- Project Number/s (if applicable): Alternative 1: KC-46A Beddown at MacDill AFB, Florida

- Projected Action Start Date: 10 / 2025

- Action Purpose and Need:
   The purpose of the Proposed Action is to recapitalize aging tanker aircraft (KC-135 Stratotanker) currently used by the Department of the Air Force with the KC-46A model to better address current and future mission requirements, offer expanded capability, and provide life-cycle cost savings in comparison to continued operation of existing KC-135 Stratotanker.

   The Proposed Action to establish Main Operating Base #6 (MOB 6) is intended to provide a fully capable, combat operational KC-46A aerial refueling force at the MOB 6 location(s) to accomplish aerial refueling and related missions. The mission-ready KC-46A squadrons would allow immediate and effective employment in exercises, peacekeeping operations, contingencies, and combat. Bedding down and operating the KC-46A would allow DAF to maintain combat capability and mission readiness as U.S. military resources commit to missions throughout the world.

   The MOB 6 beddown of the KC-46A is needed because the KC-46A would provide mission essential capabilities currently lacking in the existing tanker fleet, resulting in fully capable, combat-operational tanker force to accomplish aerial refueling and related worldwide missions. Additional capabilities include receiver capability, night vision, multi-point refueling, connectivity to command and control assets, and defensive protection.

- Action Description:
   Alternative 1 would base 24 KC-46A aircraft in two squadrons of 12 Primary Aerospace Vehicle Authorization (PAA) at MacDill AFB as an active duty, continental United States location for the KC-46A Main Operating Base #6 (MOB 6) beddown. The KC-46A beddown would occur in two stages: a beddown stage and an operational stage. The beddown stage would involve construction/retrofit of required facilities, infrastructure, and prepared surfaces, which includes renovation, alteration, and demolition. The beddown stage would also include preparing support facilities for new personnel and students to support the mission. The operational stage would involve conducting day-to-day activities (e.g., operational missions, maintenance) at the installation, including flight operations and training in the existing regional airspace.

- Point of Contact
   Name: Carolyn Hein

Title: Contractor
Organization: HDR EOC
Email:
Phone Number: (484) 612-1100

- Activity List:

	Activity Type	Activity Title
2.	Construction / Demolition	New Facility Construction
3.	Construction / Demolition	Facility Renovations
4.	Construction / Demolition	Facility and Airfield Improvements
5.	Personnel	Addition of Personnel
6.	Heating	Heating of New Facilities
7.	Paint Booth	KC-46A Maintenance Hangar Paint Booth
8.	Aircraft	Beddown of 24 KC-46A Aircraft at MacDill AFB, Florida - LTOs, APU, Engine Testing
9.	Aircraft	Remove 24 KC-135R Aircraft from MacDill AFB, Florida - LTOs, APU, Engine Testing
10.	Aircraft	Beddown of 24 KC-46A Aircraft at MacDill AFB, Florida - TGOs
11.	Aircraft	Remove 24 KC-135R Aircraft from MacDill AFB, Florida - TGOs

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.

B.2.2   Construction/Demolition

B.2.2.1   General Information & Timeline Assumptions

- Activity Location
   County: Hillsborough
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: New Facility Construction

- Activity Description:
   Construction of New Facilities:
      DASH-21 Facility (19,656 square feet)
      High Bay Supply/Bulk Storage Warehouse (5,798 square feet)

   Assumed no materials are required to be hauled on- or off-site due to site grading; excavated spoils will be used on-site. Conservatively assumed all site grading for new facility construction is done in FY2025.

   Also assumed the following: (1) no new emergency generator(s), or if any were needed for new facilities, their emissions would be offset by removing a generator(s) that was supporting KC-135 operations/facilities; (2) for special vehicles and non-road combustion equipment needed to support KC-46A operations/facilities, their operation/emissions would be equally offset by eliminating or reusing vehicles and non-road equipment that were supporting KC-135 operations/facilities; (3) KC-46A deicing, fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the KC-135 operations/facilities.

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- Activity Start Date
 Start Month: 10
 Start Month: 2025

- Activity End Date
 Indefinite: False
 End Month: 9
 End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.169184
SO$_x$	0.016317
NO$_x$	4.830554
CO	7.314629
PM 10	1.939042

Pollutant	Total Emissions (TONs)
PM 2.5	0.166124
Pb	0.000000
NH$_3$	0.004882
CO$_2$e	1572.4

B.2.2.2 Site Grading Phase

B.2.2.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
 Start Month: 10
 Start Quarter: 1
 Start Year: 2025

- Phase Duration
 Number of Month: 3
 Number of Days: 0

B.2.2.2.2 Site Grading Phase Assumptions

- General Site Grading Information
 Area of Site to be Graded (ft^2): 25454
 Amount of Material to be Hauled On-Site (yd^3): 0
 Amount of Material to be Hauled Off-Site (yd^3): 0

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

- Construction Exhaust (default)

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

- Vehicle Exhaust
 Average Hauling Truck Capacity (yd^3): 20 (default)
 Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

B.2.2.2.3   *Site Grading Phase Emission Factor(s)*

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89

Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60

Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45

Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

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

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.2.2.4   *Site Grading Phase Formula(s)*

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

    CEE_{POL}: Construction Exhaust Emissions (TONs)
    NE: Number of Equipment
    WD: Number of Total Work Days (days)
    H: Hours Worked per Day (hours)

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EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

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

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

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

B.2.2.3   Trenching/Excavating Phase

B.2.2.3.1   Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month:	10
Start Quarter:	1
Start Year:	2025

- Phase Duration
Number of Month:	4
Number of Days:	0

B.2.2.3.2   *Trenching / Excavating Phase Assumptions*

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft^2):	25454
Amount of Material to be Hauled On-Site (yd^3):	0
Amount of Material to be Hauled Off-Site (yd^3):	0

- Trenching Default Settings

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

- Construction Exhaust (default)

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

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3):	20 (default)
Average Hauling Truck Round Trip Commute (mile):	20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

B.2.2.3.3   *Trenching / Excavating Phase Emission Factor(s)*

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89

Other Construction Equipment Composite

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60

Rubber Tired Dozers Composite

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45

Tractors/Loaders/Backhoes Composite

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851

LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.2.3.4   Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

> CEE_{POL}: Construction Exhaust Emissions (TONs)
> NE: Number of Equipment
> WD: Number of Total Work Days (days)
> H: Hours Worked per Day (hours)
> EF_{POL}: Emission Factor for Pollutant (lb/hour)
> 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

> VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
> HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
> $HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
> HC: Average Hauling Truck Capacity (yd^3)
> (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
> HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

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NE: Number of Construction Equipment

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

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

B.2.2.4 Building Construction Phase

B.2.2.4.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
   Start Month: 10
   Start Quarter: 1
   Start Year: 2025

- Phase Duration
   Number of Month: 36
   Number of Days: 0

B.2.2.4.2 Building Construction Phase Assumptions

- General Building Construction Information
   Building Category: Office or Industrial
   Area of Building (ft^2):   25454
   Height of Building (ft):   35
   Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

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

- Vendor Trips Vehicle Mixture (%)

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

B.2.2.4.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.2.4.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

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

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

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

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

B.2.2.5   Architectural Coatings Phase

B.2.2.5.1   Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
    Start Month: 9
    Start Quarter: 1
    Start Year: 2028

- Phase Duration
    Number of Month: 1
    Number of Days: 0

2.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
    Building Category: Non-Residential
    Total Square Footage (ft^2):   25454
    Number of Units: N/A

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

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

- Worker Trips Vehicle Mixture (%)

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

B.2.2.5.2   Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.2.5.3   Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

    VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
    1: Conversion Factor man days to trips (1 trip / 1 man * day)
    WT: Average Worker Round Trip Commute (mile)
    PA: Paint Area (ft^2)
    800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

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

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

- Off-Gassing Emissions per Phase
$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

    VOC_{AC}: Architectural Coating VOC Emissions (TONs)
    BA: Area of Building (ft^2)
    2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
    0.0116: Emission Factor (lb/ft^2)
    2000: Conversion Factor pounds to tons

B.2.3   Construction/Demolition

B.2.3.1   General Information & Timeline Assumptions

- Activity Location
    County: Hillsborough
    Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Facility Renovations

- Activity Description:
    Facility Renovations [Assumed 25 percent of total square footage (229,376 square feet) is construction to equate the renovations]:
        ATGL Storage; Building 1042 (6,417 square feet)
        MPC/AFE; Building 6 (30,331 square feet)
        AD ARSs x 2; Building 56 (30,037 square feet)
        AFRC ARSs x 2; Building 53 (19,476 square feet)
        AFRC OSS; Building 9 (8,304 square feet)
        FUT; Building 1071 (27,370 square feet)
        Washracks and Bird Bath Facilities 563, 580, and 1359 (107,441 square feet)

    Total square footage = 229,376 square feet (25 percent of total square footage = 57,344 square feet)

    Assumed 229,376 square feet would require architectural coatings.

- Activity Start Date
    Start Month: 10
    Start Month: 2025

- Activity End Date
    Indefinite: False
    End Month: 9
    End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	3.396374
SO$_x$	0.013641
NO$_x$	4.178912
CO	6.235306
PM 10	0.143305

Pollutant	Total Emissions (TONs)
PM 2.5	0.142637
Pb	0.000000
NH$_3$	0.005041
CO$_2$e	1317.9

B.2.3.2   Building Construction Phase

B.2.3.2.1   Building Construction Phase Timeline Assumptions

- Phase Start Date
  Start Month: 10
  Start Quarter: 1
  Start Year: 2025

- Phase Duration
  Number of Month: 36
  Number of Days: 0

B.2.3.2.2   Building Construction Phase Assumptions

- General Building Construction Information
  Building Category: Office or Industrial
  Area of Building (ft^2): 57344
  Height of Building (ft): 35
  Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

B.2.3.2.3   Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite							
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite							
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite							
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite							
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite							
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.3.2.4   Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

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

    CEE_{POL}: Construction Exhaust Emissions (TONs)
    NE: Number of Equipment
    WD: Number of Total Work Days (days)
    H: Hours Worked per Day (hours)
    EF_{POL}: Emission Factor for Pollutant (lb/hour)
    2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase
$$VMT_{WT} = WD * WT * 1.25 * NE$$

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

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

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

- Vender Trips Emissions per Phase
$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

B.2.3.3   Architectural Coatings Phase

B.2.3.3.1   Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
   Start Month: 4
   Start Quarter: 1
   Start Year: 2028

- Phase Duration
   Number of Month: 6
   Number of Days: 0

B.2.3.3.2   Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
   Building Category: Non-Residential
   Total Square Footage (ft^2):   229376
   Number of Units: N/A

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

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

- Worker Trips Vehicle Mixture (%)

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

B.2.3.3.3   Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.3.3.4   Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

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

   VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
   1: Conversion Factor man days to trips (1 trip / 1 man * day)
   WT: Average Worker Round Trip Commute (mile)
   PA: Paint Area (ft^2)
   800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

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

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

- Off-Gassing Emissions per Phase
$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

B.2.4   Construction/Demolition

B.2.4.1   General Information & Timeline Assumptions

- Activity Location
   County: Hillsborough
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Facility and Airfield Improvements

- Activity Description:
Facility and Airfield Improvements:
   Add/Alter AGE; Construct Jack Testing Pad in Maintenance Building; Building 552 (18,614 square feet)
   Add/Alter Ed Ctr/ALS; Building 252 (37,685 square feet renovation area; 2,850 square feet addition)
   Add/Alter Corrosion Control Hangar 1 (75,350 square foot renovation area; 11,302 square foot addition)
   Add/Alter General Purpose MX Hangar 2 (69,707 square foot renovation area; 11,302 square foot addition)
   Add/Alter General Purpose MX Hangar 3 (11,302 square foot addition)
   Add/Alter General Purpose MX Hangar 4 (69,707 square foot renovation area; 11,302 square foot addition)
   Add/Alter Fuel Cell Hangar 5 (47,716 square foot renovation area; 11,302 square foot addition)
   Add/Alter Wheel and Tire Shop; Building 44 (4,000 square feet)
   Add/Alter BOT; Building 295 (5,005 square foot renovation; 1,604 square footage addition)
   Add/Alter AMU; Building 55 (22,199 square feet)
   Add/Alter Apron & Hydrant Fueling Pits (679,666 square foot renovation; 371,667 square foot addition)

   For buildings where renovations are to be determined or where both renovations and additions are to be determined, assumed total square footage would undergo renovations.

Assumed 25 percent of total building renovation area is construction to equate the renovations. Assumed 100 percent of additional square footage is construction to equate the additions. Assumed 100 percent of building renovations and additions would require architectural coatings.

Total building renovation square footage = 465,206 square feet
25 percent of total building renovation square footage = 116,301.5 square feet
Total building addition square footage = 49,662 square feet

Total assumed construction area: 165,963.5 square feet

Assumed 500 square feet needed for trenching plus total facility and airfield renovation/addition square footage for excavation.

- **Activity Start Date**
    Start Month: 10
    Start Month: 2025

- **Activity End Date**
    Indefinite: False
    End Month: 9
    End Month: 2028

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	7.643912
SOₓ	0.026862
NOₓ	9.316662
CO	13.212183
PM 10	53.389972

Pollutant	Total Emissions (TONs)
PM 2.5	0.411725
Pb	0.000000
NH₃	0.009976
CO₂e	2632.8

B.2.4.2   Trenching/Excavating Phase

B.2.4.2.1   Trenching / Excavating Phase Timeline Assumptions

- **Phase Start Date**
    Start Month: 10
    Start Quarter: 1
    Start Year: 2025

- **Phase Duration**
    Number of Month: 4
    Number of Days: 0

B.2.4.2.2   Trenching / Excavating Phase Assumptions

- **General Trenching/Excavating Information**
    Area of Site to be Trenched/Excavated (ft²):   1331337
    Amount of Material to be Hauled On-Site (yd³):   0
    Amount of Material to be Hauled Off-Site (yd³):   0

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

**HEADQUARTERS AIR
MOBILITY COMMAND**

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

B.2.4.2.3   Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

B.2.4.2.4   Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

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

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

     CEE_{POL}: Construction Exhaust Emissions (TONs)
     NE: Number of Equipment

HEADQUARTERS AIR MOBILITY COMMAND

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

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

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

B.2.4.3   Building Construction Phase

B.2.4.3.1   Building Construction Phase Timeline Assumptions

- Phase Start Date
   Start Month: 10
   Start Quarter: 1
   Start Year: 2025

- Phase Duration
   Number of Month: 36

Number of Days: 0

B.2.4.3.2   Building Construction Phase Assumptions

- General Building Construction Information
   Building Category: Office or Industrial
   Area of Building (ft^2):   165963.5
   Height of Building (ft):   35
   Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

B.2.4.3.3   Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.4.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

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

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

- Vender Trips Emissions per Phase
$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

B.2.4.4 Architectural Coatings Phase

B.2.4.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 1
Number of Days: 0

B.2.4.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 514868
Number of Units: N/A

- Architectural Coatings Default Settings

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

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

- Worker Trips Vehicle Mixture (%)

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

B.2.4.4.3   Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.4.4.4   Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

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

    VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
    1: Conversion Factor man days to trips (1 trip / 1 man * day)
    WT: Average Worker Round Trip Commute (mile)
    PA: Paint Area (ft^2)
    800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

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

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

- Off-Gassing Emissions per Phase

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

    VOC_{AC}: Architectural Coating VOC Emissions (TONs)
    BA: Area of Building (ft^2)
    2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
    0.0116: Emission Factor (lb/ft^2)
    2000: Conversion Factor pounds to tons

B.2.4.5   Paving Phase

B.2.4.5.1   Paving Phase Timeline Assumptions

- Phase Start Date
   Start Month: 10
   Start Quarter: 1
   Start Year: 2025

- Phase Duration
   Number of Month: 36
   Number of Days: 0

B.2.4.5.2   Paving Phase Assumptions

- General Paving Information
   Paving Area (ft^2):   1051333

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

B.2.4.5.3   Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077

HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

B.2.4.5.4   Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

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

> CEE_{POL}: Construction Exhaust Emissions (TONs)
> NE: Number of Equipment
> WD: Number of Total Work Days (days)
> H: Hours Worked per Day (hours)
> EF_{POL}: Emission Factor for Pollutant (lb/hour)
> 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

> VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
> PA: Paving Area (ft^2)
> 0.25: Thickness of Paving Area (ft)
> (1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
> HC: Average Hauling Truck Capacity (yd^3)
> (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
> HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

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

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

**HEADQUARTERS AIR
MOBILITY COMMAND**

- Off-Gassing Emissions per Phase

$VOC_P = (2.62 * PA) / 43560$

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

B.2.5 Personnel

B.2.5.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline?   Add

- Activity Location
   County: Hillsborough
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Addition of Personnel

- Activity Description:
   Net change of additional 221 military personnel, additional 13 government civilian and contractor personnel, and additional 49 military dependents and family members. Conservatively assumed all military dependents and family members commute.

- Activity Start Date
   Start Month: 10
   Start Year: 2028

- Activity End Date
   Indefinite: Yes
   End Month: N/A
   End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.524446
SO$_x$	0.003524
NO$_x$	0.423095
CO	6.010837
PM 10	0.009370

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.007978
Pb	0.000000
NH$_3$	0.032357
CO$_2$e	539.4

B.2.5.2   Personnel Assumptions

- Number of Personnel
   Active Duty Personnel: 221
   Civilian Personnel: 13
   Support Contractor Personnel: 0
   Air National Guard (ANG) Personnel: 0
   Reserve Personnel: 0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile):   20 (default)

- Personnel Work Schedule

Active Duty Personnel:	5 Days Per Week (default)
Civilian Personnel:	5 Days Per Week (default)
Support Contractor Personnel:	5 Days Per Week (default)
Air National Guard (ANG) Personnel:	4 Days Per Week (default)
Reserve Personnel:	4 Days Per Month (default)

B.2.5.3   *Personnel On Road Vehicle Mixture*

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

B.2.5.4   *Personnel Emission Factor(s)*

- On Road Vehicle Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

B.2.5.5   *Personnel Formula(s)*

- Personnel Vehicle Miles Travel for Work Days per Year

$$VMT_P = NP * WD * AC$$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

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

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

B.2.6   Heating

B.2.6.1   General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?**   Add

- **Activity Location**
    County: Hillsborough
    Regulatory Area(s):   NOT IN A REGULATORY AREA

- **Activity Title:** Heating of New Facilities

- **Activity Description:**
    Heating of new facilities: DASH-21 Facility (19,656 square feet); and High Bay Supply/Bulk Storage Warehouse (5,798 square feet). Heating for facility additions (49,662 total square feet).

- **Activity Start Date**
    Start Month: 10
    Start Year: 2028

- **Activity End Date**
    Indefinite: Yes
    End Month: N/A
    End Year: N/A

- **Activity Emissions:**

Pollutant	Emissions Per Year (TONs)
VOC	0.014617
SO_x	0.001595
NO_x	0.265768
CO	0.223245
PM 10	0.020198

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.020198
Pb	0.000000
NH_3	0.000000
CO_2e	320.0

B.2.6.2   Heating Assumptions

- **Heating**
    Heating Calculation Type: Heat Energy Requirement Method

- **Heat Energy Requirement Method**
    Area of floorspace to be heated (ft^2):   75116
    Type of fuel: Natural Gas
    Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
    Heat Value ($MMBtu/ft^3$):   0.00105
    Energy Intensity ($MMBtu/ft^2$):   0.0743

- Default Settings Used: Yes

- Boiler/Furnace Usage
    Operating Time Per Year (hours):   900 (default)

B.2.6.3   Heating Emission Factor(s)

- Heating Emission Factors (lb/1000000 scf)

VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
5.5	0.6	100	84	7.6	7.6			120390

B.2.6.4   Heating Formula(s)

- Heating Fuel Consumption ft^3 per Year
    $FC_{HER} = HA * EI / HV / 1000000$

    FC_{HER}: Fuel Consumption for Heat Energy Requirement Method
    HA: Area of floorspace to be heated (ft^2)
    EI: Energy Intensity Requirement (MMBtu/ft^2)
    HV: Heat Value (MMBTU/ft^3)
    1000000: Conversion Factor

- Heating Emissions per Year
    $HE_{POL} = FC * EF_{POL} / 2000$

    HE_{POL}: Heating Emission Emissions (TONs)
    FC: Fuel Consumption
    EF_{POL}: Emission Factor for Pollutant
    2000: Conversion Factor pounds to tons

B.2.7   Paint Booth

B.2.7.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline?   Add

- Activity Location
    County: Hillsborough
    Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: KC-46A Maintenance Hangar Paint Booth

- Activity Description:
    KC-46A Maintenance Hangar Paint Booth. Assumed paint booth is relatively small and its operation and emissions will be similar to the reduction in maintenance painting conducted for the KC-135 aircraft that will be removed from the installation. Therefore, it is assumed no emissions increase due to painting.

- Activity Start Date
    Start Month: 10
    Start Year: 2028

- Activity End Date
 Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO$_x$	0.000000
NO$_x$	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.000000
Pb	0.000000
NH$_3$	0.000000
CO$_2$e	0.0

B.2.7.2   Paint Booth Assumptions

- Paint Booth
 Coating throughput (gallons/year): 0

- Default Settings Used: Yes

- Paint Booth Consumption
 Coating used: Quick Dry Enamel (default)
 Specific gravity of coating: 1.19 (default)
 Coating VOC content by weight (%): 32 (default)
 Efficiency of control device (%): 0 (default)

B.2.7.3   Paint Booth Formula(s)

- Paint Booth Emissions per Year
 $PBE_{VOC} = (VOC / 100) * CT * SG * 8.35 * (1 - (CD / 100)) / 2000$

 PBE_{VOC}: Paint Booth VOC Emissions (TONs per Year)
 VOC: Coating VOC content by weight (%)
 (VOC / 100): Conversion Factor percent to decimal
 CT: Coating throughput (gallons/year)
 SG: Specific gravity of coating
 8.35: Conversion Factor the density of water
 CD: Efficiency of control device (%)
 (1 - (CD / 100)): Conversion Factor percent to decimal (Not effected by control device)
 2000: Conversion Factor pounds to tons

B.2.8 Aircraft

B.2.8.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
 County: Hillsborough
 Regulatory Area(s): NOT IN A REGULATORY AREA

HEADQUARTERS AIR MOBILITY COMMAND

- Activity Title: Beddown of 24 KC-46A Aircraft at MacDill AFB, Florida - LTOs, APU, Engine
Testing

- Activity Description:

Beddown 24 KC-46A Aircraft at MacDill AFB, and associated LTOs, APU, and Engine Run-
up Testing operations. Assumed aerospace ground equipment (AGE) used for the KC-46A
that would be added would be similar to the AGE used for the KC-135A that would be
removed. Therefore, AGE-related emissions added from KC-46A beddown would be similar
to the reduction in AGE-related emissions from KC-135 removal. Therefore, it is assumed no
net emissions change from AGE.

- Activity Start Date
Start Month: 10
Start Year: 2028

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)		Pollutant	Emissions Per Year (TONs)
VOC	9.725478		PM 2.5	0.227532
SO$_x$	3.869567		Pb	0.000000
NO$_x$	68.681025		NH$_3$	0.000000
CO	35.517619		CO$_2$e	11207.7
PM 10	0.262188			

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

Pollutant	Emissions Per Year (TONs)		Pollutant	Emissions Per Year (TONs)
VOC	9.604696		PM 2.5	0.213361
SO$_x$	3.619114		Pb	0.000000
NO$_x$	62.757517		NH$_3$	0.000000
CO	34.964277		CO$_2$e	10450.7
PM 10	0.245676			

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)		Pollutant	Emissions Per Year (TONs)
VOC	0.120782		PM 2.5	0.014171
SO$_x$	0.250453		Pb	0.000000
NO$_x$	5.923508		NH$_3$	0.000000
CO	0.553342		CO$_2$e	757.0
PM 10	0.016512			

B.2.8.2   Aircraft & Engines

B.2.8.2.1   Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: KC-46A
Engine Model: PW4062

Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
   Is Aircraft & Engine a Surrogate?   No
   Original Aircraft Name:
   Original Engine Name:

B.2.8.2.2   *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$_2$e
Idle	1666.68	12.49	1.07	3.78	42.61	0.11	0.10	3234
Approach	5698.45	0.10	1.07	12.17	1.93	0.05	0.04	3234
Intermediate	16865.19	0.08	1.07	25.98	0.50	0.07	0.06	3234
Military	21627.13	0.09	1.07	34.36	0.61	0.08	0.07	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.2.8.3   *Flight Operations*

B.2.8.3.1   *Flight Operations Assumptions*

- Flight Operations
   Number of Aircraft: 24
   Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1306.5
   Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
   Number of Annual Trim Test(s) per Aircraft: 1

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
   Taxi/Idle Out [Idle] (mins):   10.16
   Takeoff [Military] (mins):   1.29
   Takeoff [After Burn] (mins):   0
   Climb Out [Intermediate] (mins):   2.29
   Approach [Approach] (mins):   6.54
   Taxi/Idle In [Idle] (mins):   10.16

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff 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):   12
   AfterBurn (mins):   0

B.2.8.3.2   *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)

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

- Aircraft Emissions for Trim per Year

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

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

B.2.8.4 Auxiliary Power Unit (APU)

B.2.8.4.1 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	0.87	No	GTCP 331-200ER	Honeywell Inc.

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
GTCP 331-200ER	267.9	0.115	0.284	2.548	1.110	-1.000	-1.000	-1.0

B.2.8.4.2 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

B.2.8.5 Aircraft Engine Test Cell

B.2.8.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
  Total Number of Aircraft Engines Tested Annually: 48

- Default Settings Used: No

- Annual Run-ups / Test Durations
    Annual Run-ups (Per Aircraft Engine):   1
    Idle Duration (mins):   12
    Approach Duration (mins):   27
    Intermediate Duration (mins):   9
    Military Duration (mins):   12
    After Burner Duration (mins):   0

B.2.8.5.2   Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

B.2.8.5.3   Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

    $TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
    TD: Test Duration (min)
    60: Conversion Factor minutes to hours
    FC: Fuel Flow Rate (lb/hr)
    1000: Conversion Factor pounds to 1000pou
nds
    EF: Emission Factor (lb/1000lb fuel)
    NE: Total Number of Engines (For All Aircraft)
    ARU: Annual Run-ups (Per Aircraft Engine)
    2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$

    $TestCell$: Aircraft Engine Test Cell Emissions (TONs)
    $TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
    $TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
    $TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
    $TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
    $TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

B.2.9 Aircraft

B.2.9.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline?   Remove

- Activity Location
    County: Hillsborough
    Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Remove 24 KC-135R Aircraft from MacDill AFB, Florida - LTOs, APU, Engine Testing

- Activity Description:
Remove 24 KC-135R Aircraft and associated operations (LTOs, APU, and Engine Testing) at MacDill AFB.

- Activity Start Date
Start Month: 10
Start Year: 2028

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	-0.158940	PM 2.5	-1.090785
SO$_x$	-2.136611	Pb	0.000000
NO$_x$	-15.188473	NH$_3$	0.000000
CO	-19.005545	CO$_2$e	-6457.8
PM 10	-2.915565		

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

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	-0.150614	PM 2.5	-0.969441
SO$_x$	-1.956211	Pb	0.000000
NO$_x$	-13.634753	NH$_3$	0.000000
CO	-18.159451	CO$_2$e	-5912.5
PM 10	-2.682746		

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	-0.008326	PM 2.5	-0.121344
SO$_x$	-0.180399	Pb	0.000000
NO$_x$	-1.553719	NH$_3$	0.000000
CO	-0.846094	CO$_2$e	-545.2
PM 10	-0.232820		

B.2.9.2   Aircraft & Engines

B.2.9.2.1   Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: KC-135R
Engine Model: F108-CF-100
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate
    Is Aircraft & Engine a Surrogate?   No
    Original Aircraft Name:
    Original Engine Name:

B.2.9.2.2   *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$_2$e
Idle	1136.00	0.19	1.07	3.88	23.65	2.07	0.16	3234
Approach	2547.00	0.06	1.07	5.73	8.57	1.55	0.76	3234
Intermediate	5650.00	0.03	1.07	11.04	2.32	0.65	0.36	3234
Military	6458.00	0.03	1.07	12.05	0.36	1.59	1.02	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.2.9.3   *Flight Operations*

B.2.9.3.1   *Flight Operations Assumptions*

- Flight Operations
    Number of Aircraft: 24
    Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 631
    Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
    Number of Annual Trim Test(s) per Aircraft: 1

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
    Taxi/Idle Out [Idle] (mins):   10.16
    Takeoff [Military] (mins):   1.41
    Takeoff [After Burn] (mins):   0
    Climb Out [Intermediate] (mins):   3.58
    Approach [Approach] (mins):   10.4
    Taxi/Idle In [Idle] (mins):   10.16

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff 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):   12
    AfterBurn (mins):   0

B.2.9.3.2   *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

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- Aircraft Emissions for Trim per Year

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

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

B.2.9.4   Auxiliary Power Unit (APU)

B.2.9.4.1   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

B.2.9.4.2   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

B.2.9.4.3   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

B.2.9.5   Aircraft Engine Test Cell

B.2.9.5.1   Aircraft Engine Test Cell Assumptions

- Engine Test Cell
   Total Number of Aircraft Engines Tested Annually: 96

- Default Settings Used: No

- Annual Run-ups / Test Durations
   Annual Run-ups (Per Aircraft Engine):   1
   Idle Duration (mins):   12
   Approach Duration (mins):   27
   Intermediate Duration (mins):   9
   Military Duration (mins):   12

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After Burner Duration (mins):   0

B.2.9.5.2   Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

B.2.9.5.3   Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

   $TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
   TD: Test Duration (min)
   60: Conversion Factor minutes to hours
   FC: Fuel Flow Rate (lb/hr)
   1000: Conversion Factor pounds to 1000pounds
   EF: Emission Factor (lb/1000lb fuel)
   NE: Total Number of Engines (For All Aircraft)
   ARU: Annual Run-ups (Per Aircraft Engine)
   2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$

   TestCell: Aircraft Engine Test Cell Emissions (TONs)
   $TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
   $TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
   $TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
   $TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
   $TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

B.2.10 Aircraft

B.2.10.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline?   Add

- Activity Location
   County: Hillsborough
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Beddown of 24 KC-46A Aircraft at MacDill AFB, Florida - TGOs

- Activity Description:
   Beddown 24 KC-46A Aircraft at MacDill AFB - TGOs only

- Activity Start Date
   Start Month: 10

Start Year: 2028

- Activity End Date
    Indefinite: Yes
    End Month: N/A
    End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.512713
SO_x	5.941809
NO_x	106.494523
CO	6.688060
PM 10	0.334010

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.278479
Pb	0.000000
NH_3	0.000000
CO_2e	17958.7

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

Pollutant	Emissions Per Year (TONs)
VOC	0.512713
SO_x	5.941809
NO_x	106.494523
CO	6.688060
PM 10	0.334010

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.278479
Pb	0.000000
NH_3	0.000000
CO_2e	17958.7

B.2.10.2 Aircraft & Engines

B.2.10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
    Aircraft Designation: KC-46A
    Engine Model: PW4062
    Primary Function: Transport - Bomber
    Aircraft has After burn: No
    Number of Engines: 2

- Aircraft & Engine Surrogate
    Is Aircraft & Engine a Surrogate? No
    Original Aircraft Name:
    Original Engine Name:

B.2.10.2.2 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	1666.68	12.49	1.07	3.78	42.61	0.11	0.10	3234
Approach	5698.45	0.10	1.07	12.17	1.93	0.05	0.04	3234
Intermediate	16865.19	0.08	1.07	25.98	0.50	0.07	0.06	3234
Military	21627.13	0.09	1.07	34.36	0.61	0.08	0.07	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.2.10.3   Flight Operations

B.2.10.3.1   Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 5304
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):   1.89
Approach [Approach] (mins):   5.43
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):   12
AfterBurn (mins):   0

B.2.10.3.2   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)

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$AEM_{CLIMBOUT}$: 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)

B.2.10.4   Auxiliary Power Unit (APU)

B.2.10.4.1   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	0.87	No	GTCP 331-200ER	Honeywell Inc.

B.2.10.4.2   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$_2$e
GTCP 331-200ER	267.9	0.115	0.284	2.548	1.110	-1.000	-1.000	-1.0

B.2.10.4.3   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

B.2.11 Aircraft

B.2.11.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline?   Remove

- Activity Location
   County: Hillsborough
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Remove 24 KC-135R Aircraft from MacDill AFB, Florida - TGOs

- Activity Description:
   Remove KC-135R aircraft at MacDill AFB - TGOs only

- Activity Start Date
   Start Month: 10
   Start Year: 2028

- Activity End Date
   Indefinite: Yes
   End Month: N/A
   End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)		Pollutant	Emissions Per Year (TONs)

VOC	-0.200695
SOₓ	-3.579069
NOₓ	-19.166415
CO	-28.666000
PM 10	-5.187977

PM 2.5	-2.528763
Pb	0.000000
NH₃	0.000000
CO₂e	-10817.5

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

Pollutant	Emissions Per Year (TONs)
VOC	-0.200695
SOₓ	-3.579069
NOₓ	-19.166415
CO	-28.666000
PM 10	-5.187977

Pollutant	Emissions Per Year (TONs)
PM 2.5	-2.528763
Pb	0.000000
NH₃	0.000000
CO₂e	-10817.5

B.2.11.2   Aircraft & Engines

B.2.11.2.1   Aircraft & Engines Assumptions

- Aircraft & Engine
- **Aircraft Designation:** KC-135R
- **Engine Model:** F108-CF-100
- **Primary Function:** Transport - Bomber
- **Aircraft has After burn:** No
- **Number of Engines:** 4

- Aircraft & Engine Surrogate
- **Is Aircraft & Engine a Surrogate?** No
- **Original Aircraft Name:**
- **Original Engine Name:**

B.2.11.2.2   Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SOₓ	NOₓ	CO	PM 10	PM 2.5	CO₂e
Idle	1136.00	0.19	1.07	3.88	23.65	2.07	0.16	3234
Approach	2547.00	0.06	1.07	5.73	8.57	1.55	0.76	3234
Intermediate	5650.00	0.03	1.07	11.04	2.32	0.65	0.36	3234
Military	6458.00	0.03	1.07	12.05	0.36	1.59	1.02	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.2.11.3   Flight Operations

B.2.11.3.1   Flight Operations Assumptions

- Flight Operations
- **Number of Aircraft:** 24
- **Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:** 0
- **Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:** 5130
- **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):	0
Approach [Approach] (mins):	7.68
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):	12
AfterBurn (mins):	0

B.2.11.3.2   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)

B.2.11.4   Auxiliary Power Unit (APU)

B.2.11.4.1   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

B.2.11.4.2   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

B.2.11.4.3   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

B.3   Alternative 2 – ACAM Report ROAA

1. General Information: The DAF's ACAM was used to perform an analysis to assess the potential air quality impacts associated with the action in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the EIAP (32 CFR 989); and the GCR (40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
    Base: FAIRCHILD AFB
    State: Washington
    County(s):   Spokane
    Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: KC-46A Main Operating Base #6 Beddown

c. Project Number/s (if applicable):   Alternative 2: KC-46A Beddown at Fairchild AFB, Washington

d. Projected Action Start Date: 10/2025

e. Action Description:

Alternative 2 would base 24 KC-46A aircraft in two squadrons of 12 PAA at Fairchild AFB as an active duty, Continental United States location for the KC-46A MOB 6 beddown. The KC-46A beddown would occur in two stages: beddown and operational. The beddown stage would involve construction/retrofit of required facilities, infrastructure, and prepared surfaces, which includes renovation, alteration, and demolition. The beddown stage would also include preparing support facilities for new personnel and students to support the mission. The operational stage would involve conducting day-to-day activities (e.g., operational missions, maintenance) at the installation, including flight operations and training in the existing regional airspace.

f. Point of Contact:
    Name: Carolyn Hein
    Title: Contractor
    Organization: HDR EOC
    Email:
    Phone Number: (484) 612-1100

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 DAF'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*.

"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 NAAQSs. These insignificance indicators are the 250 ton/year PSD major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5 percent of any NAAQS), and the GCR *de minimis* values (25 ton/year for lead and 100 ton/year for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5 percent 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:

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.477	250	No
NOx	2.595	250	No
CO	3.734	250	No
SOx	0.009	250	No
PM 10	72.854	250	No
PM 2.5	0.098	250	No
Pb	0.000	25	No
NH3	0.003	250	No
CO2e	856.7		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.111	250	No
NOx	6.362	250	No
CO	8.825	250	No
SOx	0.019	250	No
PM 10	21.365	250	No
PM 2.5	0.245	250	No
Pb	0.000	25	No
NH3	0.008	250	No
CO2e	1883.3		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.071	250	No
NOx	6.181	250	No
CO	8.491	250	No
SOx	0.018	250	No
PM 10	0.241	250	No
PM 2.5	0.239	250	No
Pb	0.000	25	No
NH3	0.008	250	No
CO2e	1802.0		

2028
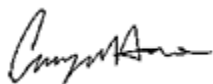
Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	14.613	250	No
NOx	39.994	250	No
CO	7.869	250	No
SOx	1.185	250	No
PM 10	-1.217	250	No
PM 2.5	-0.368	250	No
Pb	0.000	25	No
NH3	0.018	250	No
CO2e	5351.4		

2029 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	7.979	250	No
NOx	141.432	250	No
CO	5.977	250	No
SOx	4.683	250	No
PM 10	-5.590	250	No
PM 2.5	-2.189	250	No
Pb	0.000	25	No
NH3	0.047	250	No
CO2e	15996.8		

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 would not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

_____   11/18/2022
Carolyn Hein, Contractor   DATE

B.4 Alternative 2 – Detail ACAM Report for the Beddown of 24 KC-46A PAA at Fairchild AFB

B.4.1 General Information

- Action Location
    Base: FAIRCHILD AFB
    State: Washington
    County(s): Spokane
    Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: KC-46A Main Operating Base #6 Beddown

- Project Number/s (if applicable): Alternative 2: KC-46A Beddown at Fairchild AFB, Washington

- Projected Action Start Date: 10 / 2025

- Action Purpose and Need:
The purpose of the Proposed Action is to recapitalize aging tanker aircraft (KC-135 Stratotanker) currently used by the Department of the Air Force with the KC-46A model to better address current and future mission requirements, offer expanded capability, and provide life-cycle cost savings in comparison to continued operation of existing KC-135 Stratotanker.

The Proposed Action to establish Main Operating Base #6 (MOB 6) is intended to provide a fully capable, combat operational KC-46A aerial refueling force at the MOB 6 location(s) to accomplish aerial refueling and related missions. The mission-ready KC-46A squadrons would allow immediate and effective employment in exercises, peacekeeping operations, contingencies, and combat. Bedding down and operating the KC-46A would allow DAF to maintain combat capability and mission readiness as U.S. military resources commit to missions throughout the world.

The MOB 6 beddown of the KC-46A is needed because the KC-46A would provide mission essential capabilities currently lacking in the existing tanker fleet, resulting in fully capable, combat-operational tanker force to accomplish aerial refueling and related worldwide missions. Additional capabilities include receiver capability, night vision, multi-point refueling, connectivity to command and control assets, and defensive protection.

- Action Description:
Alternative 2 would base 24 KC-46A aircraft in two squadrons of 12 Primary Aerospace Vehicle Authorization (PAA) at Fairchild AFB as an active duty, continental United States location for the KC-46A Main Operating Base #6 (MOB 6) beddown. The KC-46A beddown would occur in two stages: a beddown stage and an operational stage. The beddown stage would involve construction/retrofit of required facilities, infrastructure, and prepared surfaces, which includes renovation, alteration, and demolition. The beddown stage would also include preparing support facilities for new personnel and students to support the mission. The operational stage would involve conducting day-to-day activities (e.g., operational missions, maintenance) at the installation, including flight operations and training in the existing regional airspace

- Point of Contact

Name: Carolyn Hein
Title: Contractor
Organization: HDR EOC
Email:
Phone Number: (484) 612-1100

- Activity List:

	Activity Type	Activity Title
2.	Aircraft	Beddown 24 KC-46A Aircraft at Fairchild AFB, Washington - LTOs, APU, and Engine Testing
3.	Aircraft	Remove 24 KC-135R Aircraft from Fairchild AFB, Washington - LTOs, APU, Engine Testing
4.	Construction / Demolition	New Facility Construction
5.	Construction / Demolition	Facility Renovations
6.	Construction / Demolition	Facility and Airfield Improvements
7.	Personnel	Addition of Personnel
8.	Heating	Heating of New Facilities
9.	Paint Booth	KC-46A Maintenance Hangar Paint Booth
10.	Aircraft	Beddown 24 KC-46A Aircraft at Fairchild AFB, Washington - TGOs
11.	Aircraft	Remove 24 KC-135R Aircraft from Fairchild AFB, Washington - TGOs

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.

B.4.2   Aircraft

B.4.2.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline?   Add

- Activity Location
  County: Spokane
  Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Beddown 24 KC-46A Aircraft at Fairchild AFB, Washington - LTOs, APU, and Engine Testing

- Activity Description:
  Beddown 24 KC-46A Aircraft at Fairchild AFB, and associated LTOs, APU, and Engine Run-up Testing operations. Assumed aerospace ground equipment (AGE) used for the KC-46A that would be added would be similar to the AGE used for the KC-135A that would be removed. Therefore, AGE-related emissions added from KC-46A beddown would be similar to the reduction in AGE-related emissions from KC-135 removal. Therefore, it is assumed no net emissions change from AGE.

- Activity Start Date
  Start Month: 10
  Start Year: 2028

- Activity End Date
  Indefinite: Yes

**HEADQUARTERS AIR
MOBILE COMMAND**

End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	6.941093
SOx	3.227617
NOx	62.605160
CO	25.669911
PM 10	0.217618

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.188962
Pb	0.000000
NH3	0.000000
CO2e	9267.4

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

Pollutant	Emissions Per Year (TONs)
VOC	6.820312
SOx	2.977164
NOx	56.681652
CO	25.116568
PM 10	0.201106

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.174790
Pb	0.000000
NH3	0.000000
CO2e	8510.4

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.120782
SOx	0.250453
NOx	5.923508
CO	0.553342
PM 10	0.016512

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.014171
Pb	0.000000
NH3	0.000000
CO2e	757.0

B.4.2.2	*Aircraft & Engines*

B.4.2.2.1	*Aircraft & Engines Assumptions*

- Aircraft & Engine
	Aircraft Designation:	KC-46A
	Engine Model:	PW4062
	Primary Function:	Transport - Bomber
	Aircraft has After burn: No
	Number of Engines:	2

- Aircraft & Engine Surrogate
	Is Aircraft & Engine a Surrogate?	No
	Original Aircraft Name:
	Original Engine Name:

B.4.2.2.2	*Aircraft & Engines Emission Factor(s)*

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

	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5	CO2e
Idle	1666.68	12.49	1.07	3.78	42.61	0.11	0.10	3234
Approach	5698.45	0.10	1.07	12.17	1.93	0.05	0.04	3234
Intermediate	16865.19	0.08	1.07	25.98	0.50	0.07	0.06	3234
Military	21627.13	0.09	1.07	34.36	0.61	0.08	0.07	3234

HEADQUARTERS AIR MOBILITY COMMAND

After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.4.2.3 Flight Operations

B.4.2.3.1 Flight Operations Assumptions

- Flight Operations
    Number of Aircraft: 24
    Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1306.5
    Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
    Number of Annual Trim Test(s) per Aircraft: 1

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
    Taxi/Idle Out [Idle] (mins): 7.125
    Takeoff [Military] (mins): 1.74
    Takeoff [After Burn] (mins): 0
    Climb Out [Intermediate] (mins): 1.24
    Approach [Approach] (mins): 4.88
    Taxi/Idle In [Idle] (mins): 7.125

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff 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): 12
    AfterBurn (mins): 0

B.4.2.3.2 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)

B.4.2.4   Auxiliary Power Unit (APU)

B.4.2.4.1   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	0.87	No	GTCP 331-200ER	Honeywell Inc.

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$_2$e
GTCP 331-200ER	267.9	0.115	0.284	2.548	1.110	-1.000	-1.000	-1.0

B.4.2.4.2   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

B.4.2.5   Aircraft Engine Test Cell

B.4.2.5.1   Aircraft Engine Test Cell Assumptions

- Engine Test Cell
   Total Number of Aircraft Engines Tested Annually: 48

- Default Settings Used: No

- Annual Run-ups / Test Durations
   Annual Run-ups (Per Aircraft Engine):   1
   Idle Duration (mins):   12
   Approach Duration (mins):   27
   Intermediate Duration (mins):   9
   Military Duration (mins):   12
   After Burner Duration (mins):   0

B.4.2.5.2   Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

B.4.2.5.3   Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$$\text{TestCellPS}_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$$

TestCellPS$_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
TestCell = TestCellPS$_{IDLE}$ + TestCellPS$_{APPROACH}$ + TestCellPS$_{INTERMEDIATE}$ + TestCellPS$_{MILITARY}$ + TestCellPS$_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
TestCellPS$_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
TestCellPS$_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
TestCellPS$_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
TestCellPS$_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
TestCellPS$_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

B.4.3   Aircraft

B.4.3.1   *General Information & Timeline Assumptions*

- Add or Remove Activity from Baseline? Remove

- Activity Location
   County: Spokane
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Remove 24 KC-135R Aircraft from Fairchild AFB, Washington - LTOs, APU, Engine Testing

- Activity Description:
   Remove 24 KC-135R aircraft and associated operations (LTOs, APU, and Engine Run-up Testing) from Fairchild AFB, Washington.

- Activity Start Date
   Start Month: 10
   Start Year: 2028

- Activity End Date
   Indefinite: Yes
   End Month: N/A
   End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.126188
SOx	-1.461731
NOx	-9.604017
CO	-15.337217
PM 10	-2.210900

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.762207
Pb	0.000000
NH3	0.000000
CO2e	-4418.0

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

Pollutant	Emissions Per Year (TONs)
VOC	-0.117862
SOx	-1.281332
NOx	-8.050297
CO	-14.491123
PM 10	-1.978081

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.640863
Pb	0.000000
NH3	0.000000
CO2e	-3872.7

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.008326
SOx	-0.180399
NOx	-1.553719
CO	-0.846094
PM 10	-0.232820

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.121344
Pb	0.000000
NH3	0.000000
CO2e	-545.2

B.4.3.2   Aircraft & Engines

B.4.3.2.1   Aircraft & Engines Assumptions

- Aircraft & Engine
    Aircraft Designation: KC-135R
    Engine Model: F108-CF-100
    Primary Function: Transport - Bomber
    Aircraft has After burn: No
    Number of Engines: 4

- Aircraft & Engine Surrogate
    Is Aircraft & Engine a Surrogate?   No
    Original Aircraft Name:
    Original Engine Name:

B.4.3.2.2   Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5	CO2e
Idle	1136.00	0.19	1.07	3.88	23.65	2.07	0.16	3234
Approach	2547.00	0.06	1.07	5.73	8.57	1.55	0.76	3234
Intermediate	5650.00	0.03	1.07	11.04	2.32	0.65	0.36	3234
Military	6458.00	0.03	1.07	12.05	0.36	1.59	1.02	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.4.3.3   Flight Operations

B.4.3.3.1   Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	811
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	1

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	7.125
Takeoff [Military] (mins):	0.83
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0.61
Approach [Approach] (mins):	5.13
Taxi/Idle In [Idle] (mins):	7.125

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff 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):	12
AfterBurn (mins):	0

B.4.3.3.2   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)

B.4.3.4   Auxiliary Power Unit (APU)

B.4.3.4.1   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

B.4.3.4.2 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

B.4.3.4.3 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

B.4.3.5 Aircraft Engine Test Cell

B.4.3.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
   Total Number of Aircraft Engines Tested Annually: 96

- Default Settings Used: No

- Annual Run-ups / Test Durations
   Annual Run-ups (Per Aircraft Engine):   1
   Idle Duration (mins):   12
   Approach Duration (mins):   27
   Intermediate Duration (mins):   9
   Military Duration (mins):   12
   After Burner Duration (mins):   0

B.4.3.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

B.4.3.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)

$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

> $TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
> TD: Test Duration (min)
> 60: Conversion Factor minutes to hours
> FC: Fuel Flow Rate (lb/hr)

HEADQUARTERS AIR MOBILITY COMMAND

1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year

$\text{TestCell} = \text{TestCellPS}_{\text{IDLE}} + \text{TestCellPS}_{\text{APPROACH}} + \text{TestCellPS}_{\text{INTERMEDIATE}} + \text{TestCellPS}_{\text{MILITARY}} + \text{TestCellPS}_{\text{AFTERBURN}}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)

$\text{TestCellPS}_{\text{IDLE}}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)

$\text{TestCellPS}_{\text{APPROACH}}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)

$\text{TestCellPS}_{\text{INTERMEDIATE}}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)

$\text{TestCellPS}_{\text{MILITARY}}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)

$\text{TestCellPS}_{\text{AFTERBURN}}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

B.4.4   Construction/Demolition

B.4.4.1   *General Information & Timeline Assumptions*

- Activity Location
  County: Spokane
  Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: New Facility Construction

- Activity Description:
  Construction of New Facilities:
    2-Bay Fuel Cell and Wash Rack Hangar with Back Shops (178,013 square feet)
    Mission Planning Center (4,238 square feet)
    Installation Deployment Readiness Center (21,435 square feet)
    Squadron Operations Facility (2 KC-46A ANG) (29,745 square feet)
    Supply Warehouse (81,616 square feet)

  Total = 315,047 square feet

  Assumed no materials are required to be hauled on- or off-site due to site grading; excavated spoils will be used on-site. Conservatively assumed all site grading for new facility construction is done in FY2028.
  Also assumed the following: (1) no new emergency generator(s), or if any were needed for new facilities, their emissions would be offset by removing a generator(s) that was supporting KC-135 operations/facilities; (2) For special vehicles and non-road combustion equipment needed to support KC-46A operations/facilities, their operation/emissions would be equally offset by eliminating or reusing vehicles and non-road equipment that were supporting KC-135 operations/facilities; (3) KC-46A deicing, fuel cell maintenance, composite repair, NDI testing, and fuel storage/dispensing operations/emissions would be equally offset by eliminating those corresponding operations/emissions supporting the KC-135 operations/facilities.

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- Activity Start Date
    Start Month: 10
    Start Month: 2025

- Activity End Date
    Indefinite: False
    End Month: 9
    End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	4.684260
SOₓ	0.020011
NOₓ	6.127169
CO	8.065448
PM 10	22.148181

Pollutant	Total Emissions (TONs)
PM 2.5	0.206927
Pb	0.000000
NH₃	0.009927
CO₂e	1963.9

B.4.4.2   Site Grading Phase

B.4.4.2.1   Site Grading Phase Timeline Assumptions

- Phase Start Date
    Start Month: 10
    Start Quarter: 1
    Start Year: 2025

- Phase Duration
    Number of Month: 3
    Number of Days: 0

B.4.4.2.2   Site Grading Phase Assumptions

- General Site Grading Information
    Area of Site to be Graded (ft²):   315047
    Amount of Material to be Hauled On-Site (yd³):   0
    Amount of Material to be Hauled Off-Site (yd³):   0

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

B.4.4.2.3   Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite							
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89

Other Construction Equipment Composite							
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60

Rubber Tired Dozers Composite							
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45

Tractors/Loaders/Backhoes Composite							
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

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

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

B.4.4.2.4   Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

    CEE_{POL}: Construction Exhaust Emissions (TONs)
    NE: Number of Equipment
    WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

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

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

B.4.4.3   Trenching/Excavating Phase

B.4.4.3.1   Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 4
Number of Days: 0

B.4.4.3.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft^2): 315047

Amount of Material to be Hauled On-Site (yd^3): 0

Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings

Default Settings Used: Yes

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

- Construction Exhaust (default)

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

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

B.4.4.3.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89

Other Construction Equipment Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60

Rubber Tired Dozers Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45

Tractors/Loaders/Backhoes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211

HDGV	000.705	000.005	001.074	015.763	000.025	000.022	000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004	000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007	000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156	000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025	000.054	00399.711

B.4.4.3.4   Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)

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

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

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

B.4.4.4 Building Construction Phase

B.4.4.4.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
    Start Month: 10
    Start Quarter: 1
    Start Year: 2025

- Phase Duration
    Number of Month: 36
    Number of Days: 0

B.4.4.4.2 Building Construction Phase Assumptions

- General Building Construction Information
    Building Category: Office or Industrial
    Area of Building (ft^2): 315047
    Height of Building (ft): 35
    Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

B.4.4.4.3   *Building Construction Phase Emission Factor(s)*

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77

Forklifts Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449

Generator Sets Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057

Tractors/Loaders/Backhoes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

Welders Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

B.4.4.4.4   *Building Construction Phase Formula(s)*

- Construction Exhaust Emissions per Phase

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

    CEE_{POL}: Construction Exhaust Emissions (TONs)
    NE: Number of Equipment
    WD: Number of Total Work Days (days)
    H: Hours Worked per Day (hours)
    EF_{POL}: Emission Factor for Pollutant (lb/hour)
    2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

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

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

- Vender Trips Emissions per Phase

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

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

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2000: Conversion Factor pounds to tons

B.4.4.5 Architectural Coatings Phase

B.4.4.5.1   Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
    Start Month: 9
    Start Quarter: 1
    Start Year: 2028

- Phase Duration
    Number of Month: 1
    Number of Days: 0

B.4.4.5.2   Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
    Building Category: Non-Residential
    Total Square Footage (ft^2):   315047
    Number of Units: N/A

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

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

- Worker Trips Vehicle Mixture (%)

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

B.4.4.5.3   Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

B.4.4.5.4   Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

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

    VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
    1: Conversion Factor man days to trips (1 trip / 1 man * day)
    WT: Average Worker Round Trip Commute (mile)
    PA: Paint Area (ft^2)

800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

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

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

- Off-Gassing Emissions per Phase
$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

B.4.5   Construction/Demolition

B.4.5.1   General Information & Timeline Assumptions

- Activity Location
   County: Spokane
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Facility Renovations

- Activity Description:
   Facility Renovations [Assumed 25% of total square footage (652,671 square feet) is construction to equate the renovations]:
      KC-46A AMXS & 2 AMUs; Building 2090 (27,076 square feet)
      KC-135 AMXS & 2 AMUs; Building 2097 (25,254 square feet)
      Squadron Operations Facility (2 KC-46A AD ARSs); Building 2005 (23,892 square feet)
      Squadron Operations Facility (2 KC-135 AD ARSs); Building 2007 (26,326 square feet)
      4-Bay Hangar with Backshops; Building 2050 (463,498 square feet)
      DASH-21, AME, ATGL, Seat Pallet, Engine Storage; Building 1003 (31,499 square feet)
      AGE MX; Building 1013 (27,563 square feet)
      KC-46A CTK; Building 1017 (27,563 square feet)
      Enclosed water fill station for deicing operations (4,679 square feet)

   Total square footage = 652,671 square feet (25 percent of total square footage = 163,167.75 square feet).

   Assumed 652,671 square feet would require architectural coatings.

- Activity Start Date
   Start Month: 10
   Start Month: 2025

- Activity End Date
    Indefinite: False
    End Month: 9
    End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	8.339394
SO$_x$	0.014455
NO$_x$	4.547789
CO	6.314027
PM 10	0.154533

Pollutant	Total Emissions (TONs)
PM 2.5	0.153051
Pb	0.000000
NH$_3$	0.006879
CO$_2$e	1407.8

B.4.5.2   Building Construction Phase

B.4.5.2.1   Building Construction Phase Timeline Assumptions

- Phase Start Date
    Start Month: 10
    Start Quarter: 1
    Start Year: 2025

- Phase Duration
    Number of Month: 36
    Number of Days: 0

B.4.5.2.2   Building Construction Phase Assumptions

- General Building Construction Information
    Building Category: Office or Industrial
    Area of Building (ft^2):   163167.75
    Height of Building (ft):   35
    Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

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

- Vendor Trips Vehicle Mixture (%)

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

B.4.5.2.3   Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77

Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449

Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057

Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

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

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

B.4.5.2.4   Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

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

   CEE_{POL}: Construction Exhaust Emissions (TONs)
   NE: Number of Equipment
   WD: Number of Total Work Days (days)
   H: Hours Worked per Day (hours)
   EF_{POL}: Emission Factor for Pollutant (lb/hour)
   2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

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

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

- Vender Trips Emissions per Phase

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

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

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

B.4.5.3 Architectural Coatings Phase

B.4.5.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
    Start Month: 4
    Start Quarter: 1
    Start Year: 2028

- Phase Duration
    Number of Month: 6
    Number of Days: 0

B.4.5.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
    Building Category: Non-Residential
    Total Square Footage (ft^2): 652671
    Number of Units: N/A

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

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

- Worker Trips Vehicle Mixture (%)

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

B.4.5.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

B.4.5.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$$VMT_{WT} = (1 * WT * PA) / 800$$

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

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PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT$_{WT}$ * 0.002205 * EF$_{POL}$ * VM) / 2000

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

- Off-Gassing Emissions per Phase
VOC$_{AC}$ = (AB * 2.0 * 0.0116) / 2000.0

VOC$_{AC}$: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

B.4.6   Construction/Demolition

B.4.6.1   General Information & Timeline Assumptions

- Activity Location
   County: Spokane
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Facility and Airfield Improvements

- Activity Description:
   Facility and Airfield Improvements:
       Flight Simulator Facility / FUT Complex (50,719 square foot addition)
       Parking apron and hydrant fuel system expansion (1,612,029 square foot renovation; 398,995 square foot addition)
       Engine run-up area (195,553 square foot renovation)
       Total renovations = 1,137,582 square feet
       Total additions = 449,714 square feet

   Total assumed construction area: 50,719 square feet (i.e., Flight Simulator Facility/FUT Complex)
   (Assumed 500 square feet needed for trenching plus total facility and airfield renovation/addition square footage for excavation)

- Activity Start Date
   Start Month: 10
   Start Month: 2025

- Activity End Date
   Indefinite: False
   End Month: 9

End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	2.253511
SO$_x$	0.025918
NO$_x$	9.098818
CO	13.045229
PM 10	72.338287

Pollutant	Total Emissions (TONs)
PM 2.5	0.401796
Pb	0.000000
NH$_3$	0.008191
CO$_2$e	2522.4

B.4.6.2   Trenching/Excavating Phase

B.4.6.2.1   Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
   Start Month: 10
   Start Quarter: 1
   Start Year: 2025

- Phase Duration
   Number of Month: 4
   Number of Days: 0

B.4.6.2.2   Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
   Area of Site to be Trenched/Excavated (ft^2):   1807796
   Amount of Material to be Hauled On-Site (yd^3):   0
   Amount of Material to be Hauled Off-Site (yd^3):   0

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

- Construction Exhaust (default)

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

- Vehicle Exhaust
   Average Hauling Truck Capacity (yd^3):   20 (default)
   Average Hauling Truck Round Trip Commute (mile):   20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	50.00	50.00	0	0	0	0	0

B.4.6.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.541	000.007	000.605	004.970	000.014	000.013		000.034	00366.775
LDGT	000.730	000.010	001.051	007.932	000.016	000.014		000.034	00491.466
HDGV	001.333	000.015	003.076	026.359	000.041	000.036		000.045	00764.988
LDDV	000.257	000.003	000.316	003.374	000.007	000.006		000.008	00372.571
LDDT	000.574	000.005	000.856	006.977	000.009	000.008		000.008	00581.646
HDDV	000.839	000.014	009.019	002.812	000.375	000.345		000.029	01554.798
MC	002.423	000.008	000.845	015.088	000.029	000.026		000.050	00398.949

B.4.6.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

  CEE_{POL}: Construction Exhaust Emissions (TONs)
  NE: Number of Equipment
  WD: Number of Total Work Days (days)
  H: Hours Worked per Day (hours)
  EF_{POL}: Emission Factor for Pollutant (lb/hour)
  2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

  VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
  HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
  $HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
  HC: Average Hauling Truck Capacity (yd^3)
  (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
  HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

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

- Worker Trips Emissions per Phase

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

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

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

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

B.4.6.3   Building Construction Phase

B.4.6.3.1   Building Construction Phase Timeline Assumptions

- Phase Start Date
   Start Month: 10
   Start Quarter: 1
   Start Year: 2025

- Phase Duration
   Number of Month: 36
   Number of Days: 0

B.4.6.3.2   Building Construction Phase Assumptions

- General Building Construction Information
   Building Category: Office or Industrial
   Area of Building (ft²):   50719
   Height of Building (ft): 35
   Number of Units: N/A

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

- Construction Exhaust (default)

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

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- Vehicle Exhaust

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

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

- Vendor Trips Vehicle Mixture (%)

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

B.4.6.3.3   *Building Construction Phase Emission Factor(s)*

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	CH$_4$	CO$_2$e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

B.4.6.3.4   *Building Construction Phase Formula(s)*

- Construction Exhaust Emissions per Phase

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

    CEE_{POL}: Construction Exhaust Emissions (TONs)
    NE: Number of Equipment
    WD: Number of Total Work Days (days)
    H: Hours Worked per Day (hours)
    EF_{POL}: Emission Factor for Pollutant (lb/hour)
    2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

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

    VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
    BA: Area of Building (ft^2)
    BH: Height of Building (ft)
    (0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
    HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase

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

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

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

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

- Vender Trips Emissions per Phase

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

    VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
    BA: Area of Building (ft^2)
    BH: Height of Building (ft)
    (0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)

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

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

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

B.4.6.4 Architectural Coatings Phase

B.4.6.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 9
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 1
Number of Days: 0

B.4.6.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 50719
Number of Units: N/A

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

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

- Worker Trips Vehicle Mixture (%)

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

B.4.6.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

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6.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

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

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

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

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

- Off-Gassing Emissions per Phase

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

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

B.4.6.5   Paving Phase

B.4.6.5.1   Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 36
Number of Days: 0

B.4.6.5.2   Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2):   1756577

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

B.4.6.5.3   *Paving Phase Emission Factor(s)*

- Construction Exhaust Emission Factors (lb/hour) (default)

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

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
LDGV	000.541	000.007	000.605	004.970	000.014	000.013		000.034	00366.775
LDGT	000.730	000.010	001.051	007.932	000.016	000.014		000.034	00491.466
HDGV	001.333	000.015	003.076	026.359	000.041	000.036		000.045	00764.988
LDDV	000.257	000.003	000.316	003.374	000.007	000.006		000.008	00372.571
LDDT	000.574	000.005	000.856	006.977	000.009	000.008		000.008	00581.646
HDDV	000.839	000.014	009.019	002.812	000.375	000.345		000.029	01554.798
MC	002.423	000.008	000.845	015.088	000.029	000.026		000.050	00398.949

B.4.6.5.4   *Paving Phase Formula(s)*

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

   CEE_{POL}: Construction Exhaust Emissions (TONs)
   NE: Number of Equipment
   WD: Number of Total Work Days (days)
   H: Hours Worked per Day (hours)
   EF_{POL}: Emission Factor for Pollutant (lb/hour)
   2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

   VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
   PA: Paving Area (ft^2)
   0.25: Thickness of Paving Area (ft)
   (1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)

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HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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

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

- Worker Trips Emissions per Phase
$$VMT_{WT} = WD * WT * 1.25 * NE$$

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

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

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

- Off-Gassing Emissions per Phase
$$VOC_P = (2.62 * PA) / 43560$$

VOC$_P$: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

B.4.7   Personnel

B.4.7.1.1   *General Information & Timeline Assumptions*

- Add or Remove Activity from Baseline? Add

- Activity Location
   County: Spokane
   Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Addition of Personnel

- Activity Description:

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Net change of additional 334 military personnel, additional 4 government civilian and contractor personnel, and additional 500 military dependents and family members. Conservatively assumed all military dependents and family members commute.

- Activity Start Date
    Start Month: 10
    Start Year: 2028

- Activity End Date
    Indefinite: Yes
    End Month: N/A
    End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.699765
SO$_x$	0.005090
NO$_x$	0.637645
CO	8.213569
PM 10	0.018607

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.016563
Pb	0.000000
NH$_3$	0.046812
CO$_2$e	733.8

B.4.7.2   *Personnel Assumptions*

- Number of Personnel
    Active Duty Personnel: 334
    Civilian Personnel: 4
    Support Contractor Personnel: 0
    Air National Guard (ANG) Personnel: 0
    Reserve Personnel: 0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule
    Active Duty Personnel: 5 Days Per Week (default)
    Civilian Personnel: 5 Days Per Week (default)
    Support Contractor Personnel: 5 Days Per Week (default)
    Air National Guard (ANG) Personnel: 4 Days Per Week (default)
    Reserve Personnel: 4 Days Per Month (default)

B.4.7.3   *Personnel On Road Vehicle Mixture*

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

B.4.7.4   *Personnel Emission Factor(s)*

- On Road Vehicle Emission Factors (grams/mile)

	VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e

LDGV	000.278	000.002	000.219	003.276	000.008	000.007		000.023	00320.329
LDGT	000.351	000.003	000.382	004.545	000.010	000.009		000.024	00414.211
HDGV	000.705	000.005	001.074	015.763	000.025	000.022		000.045	00763.488
LDDV	000.122	000.003	000.133	002.396	000.004	000.004		000.008	00309.634
LDDT	000.266	000.004	000.384	004.133	000.007	000.007		000.008	00440.653
HDDV	000.498	000.013	005.110	001.743	000.169	000.156		000.028	01479.227
MC	002.339	000.003	000.821	013.581	000.029	000.025		000.054	00399.711

B.4.7.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

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

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

B.4.8 Heating

B.4.8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
    County: Spokane
    Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Heating of New Facilities

- Activity Description:
    Heating of new facilities:
        2-Bay Fuel Cell and Wash Rack Hangar with Back Shops (178,013 square feet)

Mission Planning Center (4,238 square feet)
Installation Deployment Readiness Center (21,435 square feet)
Squadron Operations Facility (29,745 square feet)
Supply Warehouse (81,616 square feet)

Heating for facility additions:
Flight Simulator Facility/FUT Complex (50,719 square feet)

Assumed heating occurs over a 6 month period for 4380 hours per year

- Activity Start Date
Start Month: 10
Start Year: 2028

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.074817
SO$_x$	0.008162
NO$_x$	1.360301
CO	1.142653
PM 10	0.103383

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.103383
Pb	0.000000
NH$_3$	0.000000
CO$_2$e	1637.7

B.4.8.2   Heating Assumptions

- Heating
Heating Calculation Type: Heat Energy Requirement Method

- Heat Energy Requirement Method
Area of floorspace to be heated (ft^2):   365766
Type of fuel: Natural Gas
Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
Heat Value (MMBtu/ft^3):   0.00105
Energy Intensity (MMBtu/ft^2):   0.0781

- Default Settings Used: No

- Boiler/Furnace Usage
Operating Time Per Year (hours):   4380

B.4.8.3   Heating Emission Factor(s)

- Heating Emission Factors (lb/1000000 scf)

VOC	SO$_x$	NO$_x$	CO	PM 10	PM 2.5	Pb	NH$_3$	CO$_2$e
5.5	0.6	100	84	7.6	7.6			120390

B.4.8.4 Heating Formula(s)

- Heating Fuel Consumption ft³ per Year

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

FC_{HER}: Fuel Consumption for Heat Energy Requirement Method
HA: Area of floorspace to be heated (ft^2)
EI: Energy Intensity Requirement ($MMBtu/ft^2$)
HV: Heat Value ($MMBTU/ft^3$)
1000000: Conversion Factor

- Heating Emissions per Year

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

HE_{POL}: Heating Emission Emissions (TONs)
FC: Fuel Consumption
EF_{POL}: Emission Factor for Pollutant
2000: Conversion Factor pounds to tons

B.4.9 Paint Booth

B.4.9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Spokane
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: KC-46A Maintenance Hangar Paint Booth

- Activity Description:
KC-46A Maintenance Hangar Paint Booth. Assumed paint booth is relatively small and its operation and emissions will be similar to the reduction in maintenance painting conducted for the KC-135 aircraft that will be removed from the installation. Therefore, it is assumed no emissions increase due to painting.

- Activity Start Date
Start Month: 10
Start Year: 2028

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO$_x$	0.000000
NO$_x$	0.000000
CO	0.000000

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.000000
Pb	0.000000
NH$_3$	0.000000
CO$_2$e	0.0

PM 10	0.000000			

B.4.9.2   Paint Booth Assumptions

- Paint Booth
    Coating throughput (gallons/year):   0

- Default Settings Used: Yes

- Paint Booth Consumption
    Coating used: Quick Dry Enamel (default)
    Specific gravity of coating: 1.19 (default)
    Coating VOC content by weight (%): 32 (default)
    Efficiency of control device (%):   0 (default)

B.4.9.3   Paint Booth Formula(s)

- Paint Booth Emissions per Year
$$PBE_{VOC}= (VOC / 100) * CT * SG * 8.35 * (1 - (CD / 100)) / 2000$$

PBE_{VOC}: Paint Booth VOC Emissions (TONs per Year)
VOC: Coating VOC content by weight (%)
(VOC / 100): Conversion Factor percent to decimal
CT: Coating throughput (gallons/year)
SG: Specific gravity of coating
8.35: Conversion Factor the density of water
CD: Efficiency of control device (%)
(1 - (CD / 100)): Conversion Factor percent to decimal (Not effected by control device)
2000: Conversion Factor pounds to tons

B.4.10 Aircraft

B.4.10.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline?   Add

- Activity Location
    County: Spokane
    Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Beddown 24 KC-46A Aircraft at Fairchild AFB, Washington - TGOs

- Activity Description:
    Beddown 24 KC-46A Aircraft at Fairchild AFB - TGOs only

- Activity Start Date
    Start Month: 10
    Start Year: 2028

- Activity End Date
    Indefinite: Yes
    End Month: N/A

End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.553461
SO$_x$	6.346934
NO$_x$	110.278778
CO	7.504077
PM 10	0.351748

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.292431
Pb	0.000000
NH$_3$	0.000000
CO$_2$e	19183.2

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

Pollutant	Emissions Per Year (TONs)
VOC	0.553461
SO$_x$	6.346934
NO$_x$	110.278778
CO	7.504077
PM 10	0.351748

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.292431
Pb	0.000000
NH$_3$	0.000000
CO$_2$e	19183.2

B.4.10.2 Aircraft & Engines

B.4.10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
  Aircraft Designation: KC-46A
  Engine Model: PW4062
  Primary Function: Transport - Bomber
  Aircraft has After burn: No
  Number of Engines: 2

- Aircraft & Engine Surrogate
  Is Aircraft & Engine a Surrogate? No
  Original Aircraft Name:
  Original Engine Name:

B.4.10.2.2 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$_2$e
Idle	1666.68	12.49	1.07	3.78	42.61	0.11	0.10	3234
Approach	5698.45	0.10	1.07	12.17	1.93	0.05	0.04	3234
Intermediate	16865.19	0.08	1.07	25.98	0.50	0.07	0.06	3234
Military	21627.13	0.09	1.07	34.36	0.61	0.08	0.07	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.4.10.3 Flight Operations

B.4.10.3.1 Flight Operations Assumptions

- Flight Operations
  Number of Aircraft: 24
  Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
  Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 5304
  Number of Annual Trim Test(s) per Aircraft: 0

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- 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):	1.85
Approach [Approach] (mins):	6.3
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):	12
AfterBurn (mins):	0

B.4.10.3.2   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)

B.4.10.4   Auxiliary Power Unit (APU)

B.4.10.4.1   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	0.87	No	GTCP 331-200ER	Honeywell Inc.

B.4.10.4.2   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$_2$e
GTCP 331-200ER	267.9	0.115	0.284	2.548	1.110	-1.000	-1.000	-1.0

B.4.10.4.3   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

B.4.11 Aircraft

B.4.11.1   General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
  County: Spokane
  Regulatory Area(s):   NOT IN A REGULATORY AREA

- Activity Title: Remove 24 KC-135R Aircraft from Fairchild AFB, Washington - TGOs

- Activity Description:
  Remove 24 KC-135R aircraft from Fairchild AFB, Washington - TGOs only

- Activity Start Date
  Start Month: 10
  Start Year: 2028

- Activity End Date
  Indefinite: Yes
  End Month: N/A
  End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.163561
SO$_x$	-3.443342
NO$_x$	-23.845448
CO	-21.216073
PM 10	-4.070915

Pollutant	Emissions Per Year (TONs)
PM 2.5	-2.027680
Pb	0.000000
NH$_3$	0.000000
CO$_2$e	-10407.3

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

Pollutant	Emissions Per Year (TONs)
VOC	-0.163561
SO$_x$	-3.443342
NO$_x$	-23.845448
CO	-21.216073
PM 10	-4.070915

Pollutant	Emissions Per Year (TONs)
PM 2.5	-2.027680
Pb	0.000000
NH$_3$	0.000000
CO$_2$e	-10407.3

B.4.11.2 Aircraft & Engines

B.4.11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
  Aircraft Designation: KC-135R
  Engine Model: F108-CF-100
  Primary Function: Transport - Bomber
  Aircraft has After burn: No
  Number of Engines: 4

- Aircraft & Engine Surrogate
  Is Aircraft & Engine a Surrogate? No
  Original Aircraft Name:
  Original Engine Name:

B.4.11.2.2 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$_2$e
Idle	1136.00	0.19	1.07	3.88	23.65	2.07	0.16	3234
Approach	2547.00	0.06	1.07	5.73	8.57	1.55	0.76	3234
Intermediate	5650.00	0.03	1.07	11.04	2.32	0.65	0.36	3234
Military	6458.00	0.03	1.07	12.05	0.36	1.59	1.02	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

B.4.11.3 Flight Operations

B.4.11.3.1 Flight Operations Assumptions

- Flight Operations
  Number of Aircraft: 24
  Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
  Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 3378.5
  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): 1.6
  Approach [Approach] (mins): 7.67
  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):	12
AfterBurn (mins):	0

B.4.11.3.2   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)

B.4.11.4 Auxiliary Power Unit (APU)

B.4.11.4.1 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

B.4.11.4.2 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$_2$e

B.4.11.4.3 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

MOB6

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