Finding of No Significant Impact
for the Ground-Based Midcourse Defense Next Generation Interceptor
Environmental Assessment/Overseas Environmental Assessment

Agency: Missile Defense Agency

Action: Finding of No Significant Impact (FONSI)

Background: The Missile Defense Agency (MDA), in cooperation with the United States (U.S.) Department of the Air Force (DAF) and Department of the Army (DA), prepared an Environmental Assessment/Overseas Environmental Assessment (EA/OEA) to evaluate the potential environmental impacts from the proposed test, deployment, and operation of a Next Generation Interceptor (NGI) to enhance the defense of the U.S. against intercontinental ballistic missile (ICBM) attack. The NGI would be an advanced interceptor (missile) fully capable of integration into the current MDA Ground- Based Midcourse Defense (GMD) system. The attached EA/OEA, which is hereby incorporated by reference, was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended; Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Parts 1500 1508); MDA NEPA Implementing Procedures (79 *Federal Register* 46410–46419); DAF Environmental Impact Analysis Process (32 CFR Part 989); and U.S. Army Regulation (AR) 200-1, Environmental Protection and Enhancement (32 CFR Part 651).

Within the Department of Defense (DoD), the MDA is responsible for developing, testing, and fielding an integrated ballistic missile defense system to defend the U.S. and its deployed forces, allies, and friends against missile attacks in all phases of flight. Since 2004, the GMD system has been the principal defense of the U.S. homeland against ballistic missile threats. The GMD system uses multiple sensors, communications systems, fire control capabilities, and Ground-Based Interceptors (GBIs) to detect, track, and destroy intermediate- and long-range ballistic missiles in space during the middle, or midcourse, phase of flight. GBIs are currently emplaced at Fort Greely, Alaska (FGA) and Vandenberg Space Force Base (VSFB), California.

The DoD is pursuing advanced capabilities to continue providing effective protection of the nation, including modernizing the GMD system with a more innovative interceptor to meet emerging threats. The NGI, if deployed, would improve system survivability and provide increased performance against current and projected ICBM threats. In March 2021, the DoD awarded two contracts to support development of the NGI. Each contracted team was tasked to design an interceptor that meets the requirements set forth by the MDA. The two conceptual designs progressed from the technology development and risk reduction phase to the product development phase, which includes ground testing of the interceptor with inert payloads. A design was selected in April 2024. As the final NGI design is forthcoming, this EA/OEA includes a range of design specifications for impact analysis.

Description of the Proposed Action: The Proposed Action is to test, deploy, and operate the NGI to update and enhance the current GBI fleet. The proposed NGI would be tested at the current GBI test site at VSFB and deployed and operated at the current deployed GBI sites of VSFB and FGA. Operation refers to long-term facility operation and not potential use of the interceptors for active national defense.

The proposed NGI would be similar in function to the GBI, intercepting incoming ICBMs outside the Earth's atmosphere and destroying them by force of impact. No nuclear or conventional explosive warheads would be used. The NGI would integrate fully into the existing GMD system and utilize the existing GBI silos.

The NGI would require the use of existing facilities at VSFB and FGA, and new facilities may be constructed at FGA. The existing GBI silos at VSFB and FGA would require minor internal modifications to accommodate the NGI. Buildings 1555 and 1819 at VSFB and Building 663 at FGA may also require modification. Potential new facilities at FGA include a Missile Assembly Building, a kill vehicle oxidizer storage facility and fuel storage facility, and Interceptor Storage Facilities. If required, all new facilities at FGA would be constructed inside the current Missile Defense Complex footprint. Facility modifications at VSFB could begin as early as 2024, and facility modifications and new facility construction at FGA could begin in 2026.

The proposed NGI would be tested at the existing GBI test facilities at VSFB. The testing phase would include transportation of the NGI components or preassembled missiles to VSFB; assembly and integration of NGI components (if required); storage, final inspection, and checkout prior to testing; ground testing; and flight testing, which also includes all pre- and post-flight activities. Ground tests and flight tests would be conducted at VSFB. Up to three flight tests of NGIs would be conducted from VSFB each year beginning as early as 2026.

Test launches of the NGI would be the same as previous GBI flight tests and would consist of single and dual interceptor launches fired to intercept one or multiple ground- or air-launched targets over the Pacific Ocean. Air launched target missiles would be launched by aircraft flying from Joint Base Pearl Harbor-Hickam in Pearl Harbor, Hawaii, or staged from Pacific Missile Range Facility Barking Sands on Kauai, Hawaii. Ground-launched target missiles would be launched from Ronald Reagan Ballistic Missile Defense Test Site, located at the U.S. Army Garrison-Kwajalein Atoll in the Republic of the Marshall Islands. The target missiles used would be within the Flexible Target Family (FTF), which consists of common missile boosters, front sections, and components that can be used to assemble a variety of different target configurations. The MDA analyzed the preparation, assembly, integration, testing, transportation, and use of FTF missiles in the Flexible Target Family Environmental Assessment and prepared a FONSI with respect to the FTF in support of the ballistic missile defense system, both of which are hereby incorporated by reference.

Following initiation of the flight test program, tactical interceptors would be deployed to and subsequently operated at VSFB and FGA. Operation refers to long term facility operation, including initial testing of the system once the tactical interceptors are emplaced and maintenance of an on-alert system.

Alternatives Considered: Under the No Action Alternative, the NGI would not be tested, deployed, and operated. NGI launch facilities at VSFB and FGA for initial defensive operations would not be established, and the MDA would not plan for or use the NGI to enhance the defense of the U.S. against the threat of a limited strategic ballistic missile attack.

The necessity to utilize existing GMD infrastructure and procedures limits the test location for NGI to VSFB. The current deployed locations for the GBI at VSFB and FGA are threat-driven. Because the intent of the NGI is to update and enhance the current GBIs, the locations for the deployed NGIs would also be

VSFB and FGA. Alternative sites could have been considered, but they would not be reasonable given the existing infrastructure and national security needs of these locations. Thus, there are no other reasonable action alternatives that meet the purpose and need.

Summary of Environmental Consequences: In assessing the environmental impacts of testing, deploying, and operating the NGI, the MDA determined that implementation of the Proposed Action would result in no significant impacts to the following environmental resources: air quality, biological resources, coastal zone management, cultural resources, environmental justice, hazardous materials and hazardous wastes, health and safety, noise, and water resources. Resources were analyzed as applicable for each proposed location, including the Broad Ocean Area (BOA) of the Pacific Ocean. The extensive use of existing facilities, minimal new construction, and consistency with ongoing activities would minimize the potential environmental impacts of the Proposed Action.

Following a review of the Proposed Action, in combination with other past, present, and reasonably foreseeable future actions at VSFB and FGA, the MDA also determined that no significant cumulative impacts would occur.

Public Review and Comment: A Notice of Availability of the Proposed Final EA/OEA and unsigned Proposed FONSI for public review and comment were published in local newspapers. Copies of the documents were placed in local libraries and posted on the MDA and VSFB public websites. The 42-day public comment period closed on July 8, 2024. The MDA reviewed and considered the comments received prior to making a decision on whether or not to sign the FONSI.

During the public comment period, MDA received two comment letters. The first letter shared California air permitting advisories and applicable regulatory requirements for the project's review and consideration. The comments in the first letter did not result in changes to the EA/OEA or FONSI. The second letter generally recommended preparation of an Environmental Impact Statement and requested the analysis of cultural resources for the BOA. Additionally, the letter requested the EA/OEA include links to references and identified an error with a reference used in the analysis of biological resources for the BOA. MDA researched previous NEPA documents that included the BOA of the Pacific Ocean and determined that additional cultural analyses were not warranted. The EA biological section was updated to include the appropriate reference and includes updated information on the potential impacts to marine mammal populations in the BOA.

Conclusion: An analysis of the Proposed Action of testing, deploying, and operating the NGI concluded that implementation would not have a significant environmental impact on the human and natural environment, either by itself or cumulatively with other actions. After thoroughly considering the facts herein, the undersigned finds that the Proposed Action is consistent with existing environmental policies and objectives set forth in NEPA and its implementing regulations. Therefore, an Environmental Impact Statement is not required.

ACTION: Finding of No Significant Impact.

APPROVE:

Laura M. DeSimone, SES
Executive Director
Missile Defense Agency

11/01/24
DATE

APPROVE:

QUIGLEY.MARCIA.L.1136861120 Digitally signed by QUIGLEY.MARCIA.L.1136861120 Date: 2024.12.02 12:38:44 -05'00'

MARCIA L. QUIGLEY, Colonel, USAF
Director, Space Force Mission Sustainment
(Engineering, Logistics, & Force Protection)

DATE

APPROVE:

MARSHALL.KEITH.ALAN.1274218319 Digitally signed by MARSHALL.KEITH.ALAN.1274218319 Date: 2025.01.31 13:50:32 -09'00'

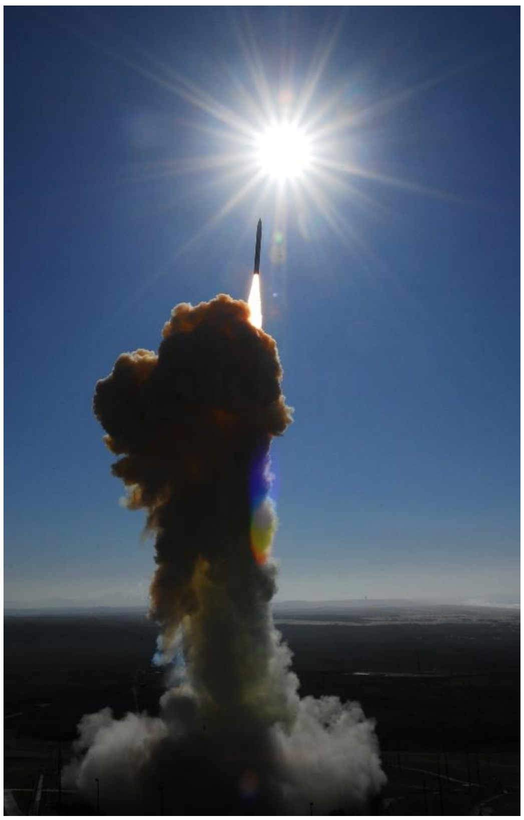
Lieutenant Colonel Keith A. Marshall
Commander, U.S. Army Garrison Fort Greely

DATE

Marin Audubon Society v FAA - Litigation

The MDA and cooperating agencies are aware of the November 12, 2024 decision in Marin Audubon Society v. Federal Aviation Administration (FAA), No. 23-1067 (D.C. Cir. Nov. 12, 2024). To the extent that a court may conclude that the CEQ regulations implementing NEPA are not judicially enforceable or binding on this agency action, the MDA and cooperating agencies have nonetheless elected to follow those regulations at 40 C.F.R. Parts 1500–1508, in addition to MDA's and the cooperating agencies' corresponding procedures/regulations implementing NEPA at 79 Federal Register 46410, 32 CFR Part 989, and 32 CFR Part 651, to meet the agencies' obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

MISSILE DEFENSE AGENCY



Ground-Based Midcourse Defense Next Generation Interceptor

Final Environmental Assessment/Overseas Environmental Assessment

October 2024

Department of Defense
Missile Defense Agency
5700 18th Street
Fort Belvoir, VA 22060-5573

Approved for Public Release
24-MDA-11929 (10 Oct 24)

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Acronyms and Abbreviations

30 CES/CEI	30th Civil Engineer Squadron, Installation Management Flight
30 CES/CEIEC	30th Civil Engineer Squadron, Installation Management Environmental Compliance
ACAM	Air Conformity Applicability Model
ACM	asbestos-containing material
ADEC	Alaska Department of Environmental Conservation
APE	Area of Potential Effects
APIMS	Air Program Information Management System
ARTCC	Air Route Traffic Control Center
AUR	All Up Round
BMDS	Ballistic Missile Defense System
BMP	best management practice
BOA	Broad Ocean Area
BV	boost vehicle
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CCA	California Coastal Act
CCMP	California Coastal Management Plan
CD	consistency determination
CDP	Census Designated Place
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2e	CO_2 equivalent
CSU	Colorado State University
CZMA	Coastal Zone Management Act
DA	Department of the Army
DACS	Divert to Attitude Control System
DAF	U.S. Department of the Air Force
dB	decibels
dBA	A-weighted decibels
DoD	Department of Defense

DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	environmental justice
EO	Executive Order
ESQD	explosive safety quantity distance
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FGA	Fort Greely, Alaska
FONSI	Finding of No Significant Impact
FTF	Flexible Target Family
GBI	Ground-Based Interceptor
GBSD	Ground-Based Strategic Deterrent
GHG	greenhouse gases
GMD	Ground-Based Midcourse Defense
HCl	hydrogen chloride
HTPB	hydroxyl-terminated polybutadiene
ICBM	intercontinental ballistic missile
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRBM	Intermediate Range Ballistic Missile
IRP	Installation Restoration Program
ISF	Interceptor Storage Facility
KV	kill vehicle
LF	Launch Facility
MAB	Missile Assembly Building
MDA	Missile Defense Agency
MDC	Missile Defense Complex
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NBC	nuclear, biological, or chemical

ND	negative determination
NEPA	National Environmental Policy Act of 1969
NGI	Next Generation Interceptor
nm	nautical miles
NMD	National Missile Defense
NMFS	National Marine Fisheries Service
NOTAM	Notice to Air Missions
NOTMAR	Local Notice to Mariners
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OAQPS	Office of Air Quality Planning and Standards
OEA	Overseas Environmental Assessment
OSHA	Occupational Safety and Health Administration
PCBs	polychlorinated biphenyls
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
PMRF	Pacific Missile Range Facility
PSD	Prevention of Significant Deterioration
ROI	region of influence
SBCAPCD	Santa Barbara County Air Pollution Control District
SHPO	State Historic Preservation Office
SLD 30	Space Launch Delta 30
SM	Solid Missile
SOP	standard operating procedure
SWPPP	Stormwater Pollution Prevention Plan
tpy	tons per year
U.S.	United States
USAG	U.S. Army Garrison
USASMDC	U.S. Army Space and Missile Defense Command
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency

USFWS	U.S. Fish and Wildlife Service
USSF	U.S. Space Force
VAFB	Vandenberg Air Force Base
VOC	volatile organic compound
VSFB	Vandenberg Space Force Base

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1.0 Purpose and Need for the Proposed Action

1.1 Introduction

The Missile Defense Agency (MDA), in cooperation with the United States (U.S.) Department of the Air Force (DAF) and the U.S. Department of the Army (DA), prepared this Environmental Assessment (EA)/Overseas Environmental Assessment (OEA) to evaluate the potential environmental impacts from the proposed test, deployment, and operation of a Next Generation Interceptor (NGI) to enhance the defense of the U.S. against intercontinental ballistic missile (ICBM) attack. The NGI would be an advanced interceptor (missile) fully capable of integration into the current MDA Ground-Based Midcourse Defense (GMD) system. This EA/OEA complies with:

- The National Environmental Policy Act of 1969 (NEPA), as amended;
- The President's Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508);
- Executive Order (EO) 12114 – *Environmental Effects Abroad of Major Federal Actions;*
- Department of Defense (DoD) regulations for implementing EO 12114 (32 CFR Part 187 – *Environmental Effects Abroad of Major Department of Defense Actions*);
- MDA NEPA Implementing Procedures (79 *Federal Register* 46410–46419);
- DAF Environmental Impact Analysis Process (32 CFR Part 989); and
- DA Regulation (AR) 200-1, Environmental Protection and Enhancement (32 CFR Part 651).

This EA/OEA considers the technology components, assets, and programs of the current GMD system that would be utilized by the proposed NGI, as well as the development and application of new technologies, and considers cumulative impacts of implementing the NGI.

1.2 Background

Title 10 of the U.S. Code mandates the DoD to protect the U.S. homeland against impending threats, whether foreign or domestic. Within the DoD, the MDA is responsible for developing, testing, and fielding a Missile Defense System to defend the U.S. and its deployed forces, allies, and friends against missile attacks in all phases of flight. The Missile Defense System provides a layered defense consisting of various land-, sea-, and air-based weapon, sensor, and communications systems and command and control platforms that are used to defeat incoming intermediate- and long-range ballistic missiles in all phases of flight.

1.2.1 Ground-Based Midcourse Defense System

In 2000, the MDA completed the National Missile Defense (NMD) Deployment Environmental Impact Statement (EIS) for a fixed, land-based, non-nuclear missile defense system. The EIS evaluated deployment of all system elements at various locations (USASMDC 2000). A Record of Decision was issued in April 2003 establishing an Initial Defensive Operations Capability at Fort Greely, Alaska (FGA), including construction of up to 40 silos (MDA 2003). Since that time, the program name changed from National Missile Defense to Ground-Based Midcourse Defense, and multiple NEPA documents have been completed for various GMD deployment locations (see **Section 1.8**).

Since 2004, the GMD system has been the principal defense of the U.S. homeland against ballistic missile threats. The GMD system uses multiple sensors, communications systems, fire control capabilities, and Ground-Based Interceptors (GBIs) to detect, track, and destroy intermediate- and long-range ballistic missiles in space during the middle, or midcourse, phase of flight (**Figure 1.2-1**). GBIs are currently emplaced at FGA and Vandenberg Space Force Base (VSFB), California.[1] Fire control, battle management, planning, tasking, and threat analysis take place via a dual-node, human-in-control interface located in FGA and Colorado Springs, Colorado. The 49th Missile Defense Battalion at FGA and the 100th Missile Defense Brigade at Colorado Springs, Colorado, operate the system.

More information on the GMD system can be found in the referenced NEPA documents listed in **Section 1.8**.

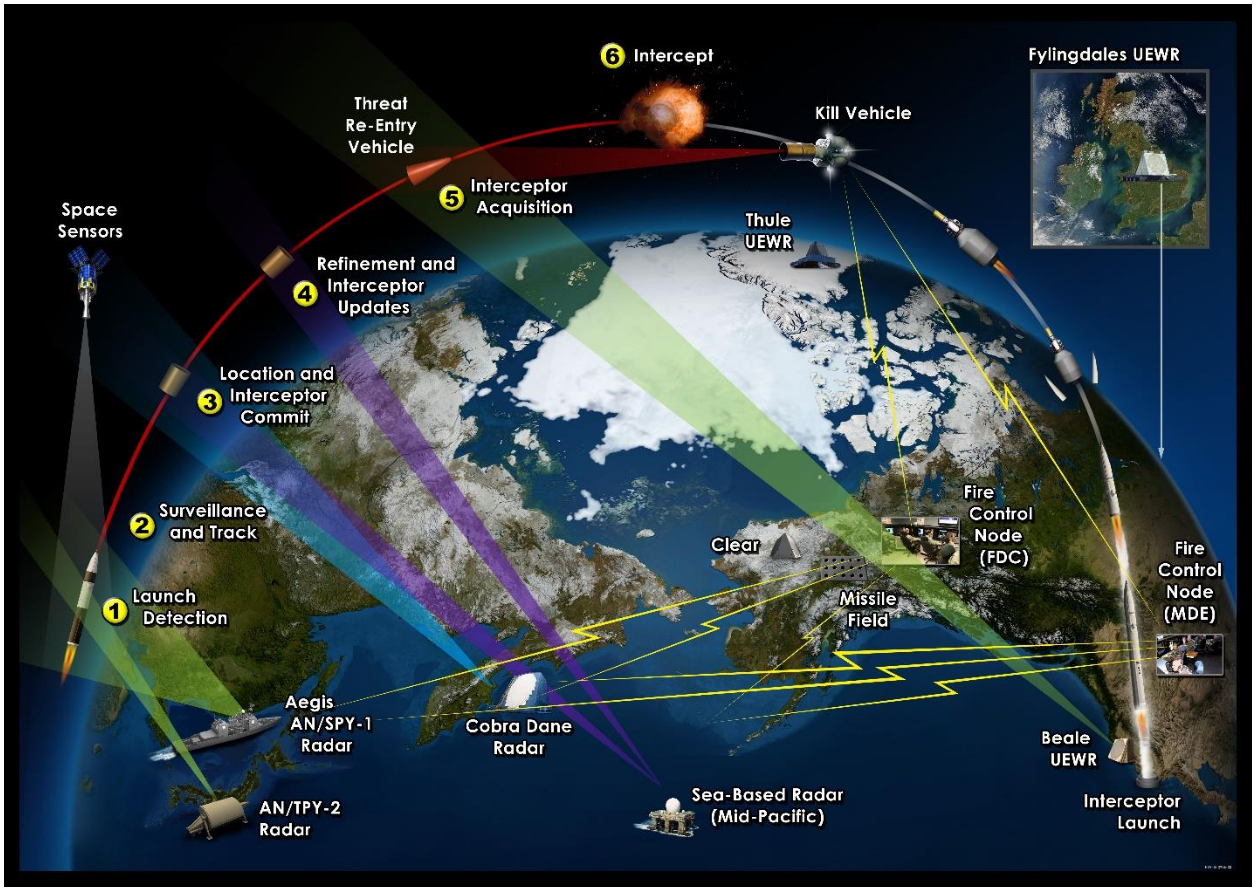

Figure 1.2-1. GMD Functional Concept

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Note: UEWR = Upgraded Early Warning Radar

1.2.2 NGI Development

The U.S. is faced with adversaries that are fielding diverse and expansive ranges of modern offensive missile systems and improving existing systems with complex capabilities. New systems under development by adversaries include maneuvering reentry vehicles, multiple independent reentry vehicles, and missiles with precision strike and new penetration aids (e.g., decoys, jamming devices). Increases in

[1] Previously known as Vandenberg Air Force Base (VAFB), the installation was renamed Vandenberg Space Force Base on May 14, 2021, to align with the recently created U.S. Space Force (USSF). The installation is referred to as VSFB throughout this EA/OEA except when VAFB is used in reference to historical documentation.

offensive missile range pose greater risk than ever to potential targets in the continental U.S. and those of allies across the globe.

The DoD is pursuing more advanced capabilities to continue providing effective protection for the nation, including modernizing the GMD system with a more innovative interceptor to meet emerging threats. The NGI would improve system survivability and provide increased performance against current and projected ICBM threats from North Korea and a potential future ICBM threat from Iran, should it emerge. On March 24, 2021, the DoD awarded two contracts to support development of the NGI program. Each contracted team was tasked to design an interceptor that meets the requirements set forth by the MDA. The two conceptual designs progressed from the technology development and risk reduction phase to the product development phase, which includes ground testing of the interceptor with inert payloads. A design was selected in April 2024. As the final design is forthcoming, this EA/OEA includes a range of design specifications for impact analysis.

1.2.3 Project Locations

1.2.3.1 Vandenberg Space Force Base

VSFB occupies approximately 99,572 acres on the south-central coast of California in Santa Barbara County (**Figure 1.2-2**). VSFB is headquarters for the Space Launch Delta 30 (SLD 30), which is the DAF organization responsible for DoD space and missile launch activities on the western coast of the U.S. SLD 30 supports West Coast launch activities for the DAF, the DoD, the MDA, the National Aeronautics and Space Administration (NASA), foreign nations, and private contractors. The western range at VSFB can reasonably support up to 110 rocket launches and 15 missile launches annually. Presently, an average of eight missile launches per year are conducted from VSFB (HB&A 2020).

Four GBIs are currently deployed at VSFB. VSFB also serves as one of the primary GMD test sites and has been used for GBI flight tests since 2004.

1.2.3.2 Fort Greely, Alaska

FGA is located on approximately 6,840 acres in Interior Alaska within the Southeast Fairbanks Census Area, approximately 110 miles southeast of Fairbanks and just south of Delta Junction (**Figure 1.2-3**). FGA is operated by the U.S. Army Garrison (USAG) Alaska and is host to multiple tenants that support the GMD initiative. The 49th Missile Defense Battalion operates the Missile Defense Complex (MDC) at FGA, where up to 40 GBIs are currently deployed in three missile fields. Construction and integration of a fourth missile field that will be able to accommodate another 20 interceptors is scheduled for completion in 2024. Interceptor flight testing is not conducted from FGA.

Basemap: World Street Map

Figure 1.2-2. Location Map – Vandenberg Space Force Base

Base Map: World Street Map

Figure 1.2-3. Location Map – Fort Greely, Alaska

1.3 Purpose and Need

The purpose of the Proposed Action is to develop a more innovative interceptor capable of providing increased protection for the U.S. from the emerging global threat of ICBM attacks. The GMD system has become a capable and credible defense for today's threat, and the Proposed Action, as part of the GMD system, is needed to enable the U.S. to defend the homeland and defeat future threat advances into the 2030s and beyond.

1.4 Decisions to Be Made

The decisions to be made are whether to test the NGI at VSFB and deploy and operate the NGI at the current GMD interceptor locations (FGA and VSFB). This EA/OEA also considers and evaluates a No-Action Alternative. A deployment decision, if made, would be based on the analysis of the ballistic missile threat to the U.S., system performance and operational effectiveness, and potential environmental impacts.

Following public review of the EA/OEA, MDA will determine if the Proposed Action will or will not individually or cumulatively result in significant impacts on the human or natural environment. MDA's determination will be issued in a Finding of No Significant Impact (FONSI) or, if significant impacts are identified, a Notice of Intent to prepare an EIS. Significance is determined through consideration of both context and intensity of potential impacts resulting from an action. Consideration of an action's potential impacts on the human environment, the affected region, the affected interests, and the locality of impacts provides context, while the intensity of an action refers to the severity of potential impact (CEQ 2005:page 29, Section 1508.27).

1.5 Scope of the Environmental Assessment

This EA/OEA identifies, evaluates, and documents the potential environmental effects of testing, deploying, and operating the NGI, including required infrastructure improvements and modifications. Operation refers to long-term facility operation, including initial testing of the system once the tactical interceptors are emplaced and maintenance of an on-alert system. This EA/OEA does not consider potential use of the interceptors for active national defense.

As discussed in **Section 1.2**, a final NGI design is forthcoming. This EA/OEA aims to provide a sufficient level of detail for NEPA analysis of the testing and eventual deployment of the NGI by analyzing a range of interceptor design specifications.

The MDA expects the NGI to fully integrate with the current GMD system and architecture. As such, the GMD system does not need to be re-assessed under NEPA, and this EA/OEA considers only those elements of the current GMD system as they would be utilized by the proposed NGI (USASMDC 2000, USASMDC 2002b, USASMDC 2002c, USASMDC 2003, MDA 2018). The proposed NGI flight tests would also use target missiles that have previously been assessed under NEPA (MDA 2007a, 2007b).

Testing of the NGI would include flight tests conducted from VSFB. While the specifics of the flight test scenarios may vary, flight tests are expected to be similar to those previously conducted to test the GBI system and would consist of interceptor launches from VSFB over the broad ocean area (BOA) of the Pacific Ocean. For the purposes of this EA/OEA, the BOA is defined as any ocean area that is outside of territorial seas. Under maritime law, territorial seas generally extend seaward up to 12 nautical miles (nm) from a nation's coastline. Potential impacts from the Proposed Action to the BOA are considered in this EA/OEA.

This EA/OEA considers the environmental resources potentially subject to impacts from the Proposed Action. Because different activities are proposed for each geographic area (i.e., VSFB, FGA, and the BOA), the resources for which a detailed analysis was conducted vary by location. The resources analyzed, and those considered but excluded from further analysis, are listed by location in **Section 3.0**.

1.6 Cooperating Agencies

Pursuant to agreements between the MDA and the DAF, the MDA is the lead agency for preparing and coordinating this EA/OEA (40 CFR Part 1501.5). The DAF and the DA are participating as cooperating agencies for consultation, review, and comment, as defined in 40 CFR Part 1501.6.

As the owner and operator of VSFB, the DAF has authority over missile launches to include ground-based operations on VSFB. The DAF intends to adopt this EA/OEA and would issue its own FONSI. Based on the analysis within this EA/OEA, the DAF will draw its own conclusions and assume responsibility for its environmental decision. This decision will support SLD 30 environmental reviews when evaluating the MDA's requests to complete actions on VSFB, along with potential renewals and modifications of real property agreements within the scope of operations analyzed in this EA/OEA.

As the owner of FGA, the DA has authority over FGA as a potential deployment site for the NGI. The 49th Missile Defense Battalion is an Alaska Army National Guard unit that is permanently on active duty at FGA as part of the 100th Missile Defense Brigade. The battalion provides operational control and security for GBIs located at FGA. The DA has supported the development of this EA/OEA and will continue to participate in subsequent environmental reviews associated with the deployment and operation of the NGI at FGA.

1.7 Federal Environmental Requirements

The Proposed Action constitutes a federal action subject to the requirements of NEPA. The CEQ issued regulations (40 CFR Parts 1500–1508) to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. Accordingly, the MDA prepared this EA/OEA through adherence to all applicable procedures (see **Section 1.1**) to evaluate alternatives, identify and evaluate potential environmental impacts, describe mitigation measures or commitments required, and communicate its findings to agency decision-makers and the public. The scope of analysis presented in this EA/OEA is defined by the potential range of environmental impacts that would result from implementation of the Proposed Action.

1.8 Related Environmental Documentation

The MDA's NEPA implementing procedures require the use of tiered environmental documents, as appropriate, to eliminate repetitive discussions of the same issues and focus on issues that are important and appropriate for discussion at each level of environmental review. This EA/OEA tiers from and incorporates by reference applicable environmental impact analyses from previously completed GMD-related NEPA documents, including those listed below (see **Section 1.2** for more detail). A complete list of documents used to prepare this EA/OEA is provided in **Section 5.0**, *References*.

- DAF, 2021. Ground-Based Strategic Deterrent (GBSD) Test Program Environmental Assessment/Overseas Environmental Assessment, June 2021.
- MDA, 2018. Ground-Based Midcourse Defense Expanded Capability Environmental Assessment, Fort Greely, Alaska, March 2018.

- DoD, 2007. Ballistic Missile Defense System (BMDS) Programmatic Environmental Impact Statement, Department of Defense Missile Defense Agency, January 2007.
- MDA, 2003. Ground-Based Midcourse Defense Initial Defensive Operations Capability at Vandenberg AFB Environmental Assessment, Missile Defense Agency, July 2003.
- U.S. Army Space and Missile Defense Command (USASMDC), 2003. Ground-Based Midcourse Defense Extended Test Range Final Environmental Impact Statement, USASMDC, July 2003.
- USASMDC, 2002. Ground-Based Midcourse Defense Validation of Operational Concept Environmental Assessment, USASMDC, March 2002.
- USASMDC, 2002. Ground-Based Midcourse Defense Validation of Operational Concept Supplemental Environmental Assessment, USASMDC, December 2002.
- USASMDC, 2000. National Missile Defense Deployment Final Environmental Impact Statement, July 2000.

1.9 Interagency and Intergovernmental Coordination and Consultations

Consistent with the MDA's NEPA implementing procedures (79 *Federal Register* 46410–46419), as well as EO 12372 – *Intergovernmental Review of Federal Programs*, the MDA involved other federal agencies and state, tribal, and local governments to prepare this EA/OEA. The MDA notified and consulted with relevant federal and state agencies to help determine the range of actions, alternatives, and potential areas of impact that should be addressed in the environmental document. Early intergovernmental coordination on environmental analysis of the proposed NGI included discussion of relevant issues at FGA and VSFB between the MDA, SLD 30, USAG Alaska, the U.S. Army Installation Management Command/Army Environmental Command, the Air Force Civil Engineering Center, and the U.S. Army Corps of Engineers.

The MDA initiated discussions with the DAF and the DA regarding NEPA review of the development, testing, and operation of the proposed NGI beginning in May 2022. The MDA has continued to host coordination meetings throughout the process, including a weekly working group call with VSFB to discuss the NGI flight test campaign and develop an integrated schedule.

Additional federal, state, and local agencies and tribes with jurisdiction that could be affected by the proposed and alternative actions were notified and consulted during the development of this EA/OEA. **Appendix A** contains the list of agencies and tribes consulted during this EA/OEA. Also included in the appendix are correspondence with each entity, responses, and concurrences (as applicable).

1.10 Summary of Public Participation

The Proposed Final EA/OEA and Proposed FONSI were released for public review and comment. The public comment period extended from May 28 through July 8, 2024. Notification of the availability of these documents was published in the following local newspapers near FGA and VSFB:

- Anchorage Daily News, Alaska
- Delta Wind, Alaska
- Fairbanks Daily News-Miner, Alaska
- Lompoc Record, California
- Santa Maria Times, California
- Santa Ynez Valley News, California

Copies of the documents were posted on the MDA, VSFB, and SLD 30 websites, and copies were placed in the following libraries:

- Delta Community Library, Delta Junction, Alaska
- Fairbanks North Star Borough Public Library, Fairbanks, Alaska
- Meicy Memorial Library, Healy Lake, Alaska
- Lompoc Public Library, Lompoc, California
- Davidson Library, University of California, Santa Barbara, California
- Santa Barbara Public Library, Santa Barbara, California
- Santa Maria Public Library, Santa Maria, California
- Vandenberg Public Library, VSFB, California

During the public comment period, MDA received two comment letters on the Proposed Final EA/OEA. The first letter shared California air permitting advisories and applicable regulatory requirements for review and consideration of the Proposed Action. The comments in the first letter did not result in changes to the EA/OEA or FONSI. The second letter generally recommended preparation of an EIS and requested the analysis of cultural resources for the BOA. Additionally, the letter requested that the EA/OEA include links to references and identified an error with a reference used in the analysis of biological resources for the BOA.

In response to the request to analyze potential impacts to cultural resources in the BOA, MDA researched previous NEPA documents that included the BOA of the Pacific Ocean. These documents did not identify the Pacific Ocean or BOA specifically as culturally significant, nor had consultation requests been received regarding activities in the BOA. General concerns regarding protection of submerged historic artifacts, such as sunken ships, and the importance of ocean navigational paths between the Hawaiian Islands were identified; however, the Proposed Action BOA included in this EA does not overlap with navigation paths between the Hawaiian Islands or known submerged historic artifacts. **Section 4.3.1** has been updated to include the appropriate reference and includes updated information on the potential impacts to marine mammal populations in the BOA. Section 7.0 has been updated for reference hyperlinks.

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2.0 Proposed Action and Alternatives

2.1 Proposed Action

The Proposed Action is to test, deploy, and operate the NGI to update and enhance the current GBI fleet. The proposed NGI would be tested at the current GBI test site at VSFB and deployed and operated at the current deployed GBI sites of VSFB and FGA. Operation refers to long-term facility operation and not potential use of the interceptors for active national defense. This EA/OEA covers site preparations including potential infrastructure modifications and improvements, potential construction of new facilities, logistics including transportation and storage of the NGI, and flight tests over the BOA of the Pacific Ocean. Within this EA/OEA, the term launch refers to the physical blastoff of an interceptor or missile, while the term flight test includes all aspects involved in testing of equipment and collecting of performance data.

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the BOA would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

These activities are detailed in the following sections, organized by project phase and location.

2.1.1 Interceptor Description

The NGI is intended to update and enhance the current fielded GBIs and integrate fully into the existing GMD system. The proposed NGI would be similar in function to the GBIs and would utilize the existing GBI silos. As with the GBI, the NGI’s function would be to intercept incoming ballistic missile warheads outside the Earth’s atmosphere and destroy them by force of impact. No nuclear or conventional explosive warheads would be used.

The NGI would consist of the boost vehicle (BV) and payload, which would include engagement support equipment and kill vehicles (KVs). These components would be integrated to form the interceptor. A fully integrated interceptor (missile) is referred to as an All Up Round (AUR). A conceptual design of the AUR is shown in **Figure 2.1-1**.

To allow program and design flexibility, a range of NGI design specifications is presented and analyzed in this EA/OEA.

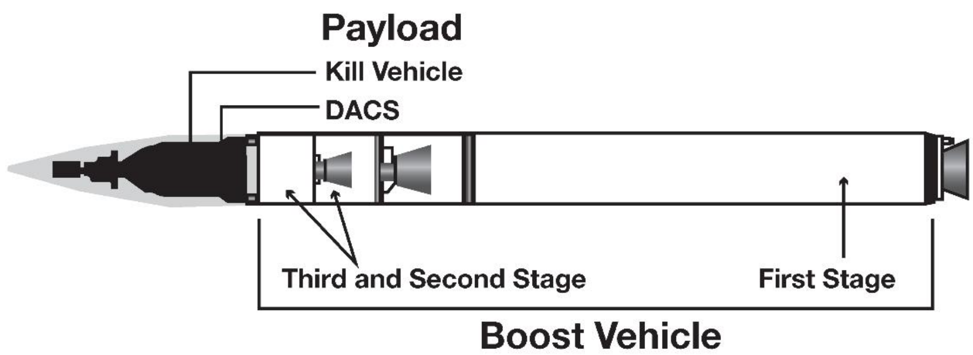

Figure 2.1-1. Notional Design of the NGI AUR

2.1.1.1 Boost Vehicle

The NGI BV would be a multi-stage (up to three stages), solid-fuel booster designed to propel multiple KVs on a trajectory to intercept a target. The BV, although using a new motor design, would consist of flight-proven heritage rocket motor components.

The BV would use 1.3 explosive hazard classification[2] solid propellant fuel. The fuel would rely on an acrylic acid/aluminum powder for fuel, combined with ammonium perchlorate as the oxidizer, and hydroxyl-terminated polybutadiene (HTPB) as the binder. This frequently used booster propellant is found in many tested and proven missiles including the GBI, Minuteman II/III, and Peacekeeper. Multiple booster fuel designs have the capability of meeting the NGI requirements. The NGI BV would be larger than the GBI, but smaller than the Peacekeeper (see **Section 2.1.1.3**).

2.1.1.2 Payload

The payload would include engagement support equipment and KVs. Each NGI would be equipped with multiple KVs (up to 12 for the purposes of analysis in this EA/OEA). The engagement support equipment would include a sensor and a Divert to Attitude Control System (DACS), which would perform tracking and discrimination of threats and direct the KVs to the targets. The KVs would separate from the booster and then locate, target, and collide with the target warhead, destroying it through the kinetic energy of the collision. No explosive or nuclear warheads would be used.

A DACS is a propulsion system that controls the position of a missile to allow for the interception of a target with great accuracy and reliability. The DACS propellant used for the NGI would be either liquid, similar to that used in the GBI payload, or solid, similar to that used in the Solid Missile (SM)-3/SM-6 missile payload. The types and ranges of payload propellants presented in **Table 2.1-1** are considered in this EA/OEA. Payload fueling could be conducted at VSFB and/or FGA.

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[2] Hazard classifications are used to establish procedures to ensure safe handling, packaging, storage, and use. Division 1.3 explosives consist of explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard (49 CFR Part 173.50(b)(3)).

Table 2.1-1. Potential NGI Payload (KV) Propellants

Propellant	Type(s)	Quantity per KV	Maximum Quantity per NGI Payload [a]
Liquid Hypergolic Propellant	MMH/MON-25 or MMH/N_2O_4 [b]	3 to 4 gallons	48 gallons
Solid Propellant	Acrylic acid/aluminum powder for fuel, ammonium perchlorate as the oxidizer, HTPB as the binder [c]	10 to 24 pounds	288 pounds

(a) Assuming 12 KVs.

(b) Liquid hypergolic propellant typically consists of a fuel and an oxidizer. A mixture of fuel monomethyl hydrazine (MMH) and oxidizer nitrogen tetroxide (N_2O_4) is used in the GBI and has been used extensively in spacecraft. Other oxidizers commonly used in rockets and missiles include mixed oxides of nitrogen (MON). Oxidizer MON-25 is a mixture of 75% N_2O_4 and 25% nitric oxide (NO).

(c) The solid propellant composition would be similar to that proposed for use in the NGI boosters.

2.1.1.3 All Up Round

As it pertains to the Proposed Action, AUR refers to a completely assembled and fueled missile ready for silo emplacement. The dimensions of the NGI AUR are not finalized. The approximate maximum dimensions are presented in **Table 2.1-2** along with those of other interceptor and ICBM systems for comparison.

Table 2.1-2. Comparison of Missile Boost Vehicles and Interceptors

Specification	NGI [a]	Peacekeeper ICBM [b]	GBI [c]	Minuteman III ICBM [d]
Weight (pounds)	110,000	195,000	50,000	80,000
Length (feet)	60–70	71	54	60
Diameter (inches)	50–72	92	50	66
Maximum Explosive Net Weight (pounds)	150,000	202,000	67,000 [e]	67,000

(a) Specifications are maximums estimated for the purposes of this EA/OEA.

(b) DAF 1989

(c) USASMDC 2003

(d) DAF 2021

(e) DAF 1999

2.1.2 Site Preparations

The Proposed Action would require the use of existing facilities at VSFB and FGA. The existing GBI silos at VSFB and FGA would require modifications to accommodate the NGI. Some facilities at VSFB and FGA would also require modifications, and new facilities may be constructed at FGA.

2.1.2.1 Vandenberg Space Force Base

The Proposed Action would require the use of several existing facilities on north VSFB. Two existing launch facilities (LFs), LF-23 and LF-24, would be used for NGI tests. These LFs have been previously used for GBI booster verification and flight tests. Other existing facilities could be used for particular functions, as shown in **Table 2.1-3**. **Figure 2.1-2** shows the general project area and encompasses the MDA facilities already being utilized at VSFB.

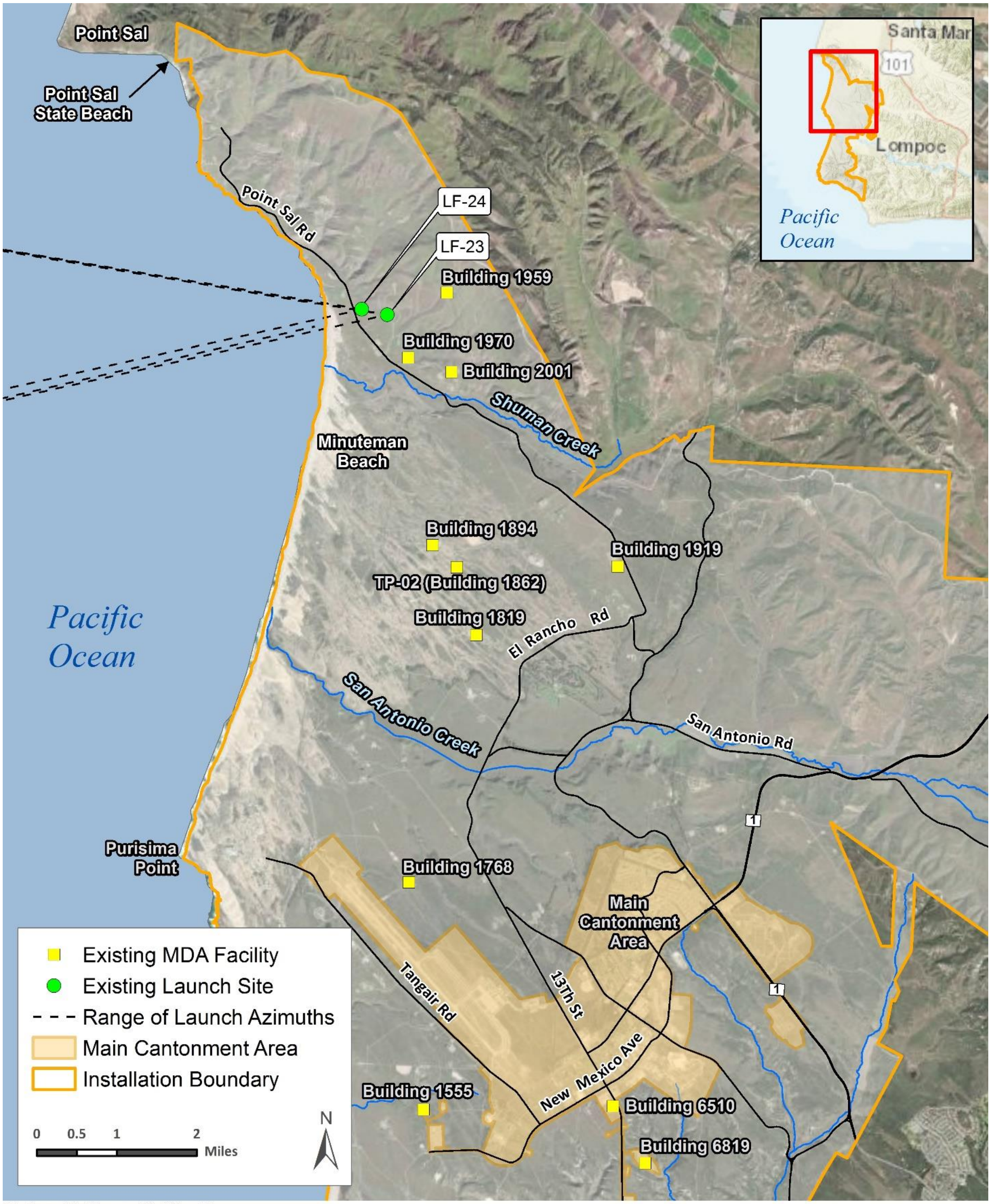
Table 2.1-3. Existing Facilities Proposed for Use at VSFB

Facility Function	Potential Locations
Interceptor Silos	LF-23, LF-24
Launch Control Center	Building 1768
Readiness Station	Building 1768
In-Flight Interceptor Communication System Data Terminal	Building 1919
Assembly, Integration, Checkout, and/or Maintenance	Buildings 1555, 1819, 1894, 6819
Interceptor Storage	Buildings 1894, 6819, TP-02 (located at Building 1862; temporary storage only)
NGI Transporter Storage	Building 1970
Payload Storage	Building 6819
Warehouse and Maintenance Storage	Off-base location
Administrative/Office Space	Buildings 1819, 1555, 1768, 1959, 2001, 6510

Existing facilities at VSFB that may require modifications to accommodate the NGI include:

- Buildings 1555 and 1819 may require electrical, mechanical, security, plumbing, structural/ architectural, and hypergolic propellant containment work.
- LF-23 and LF-24 are the current GBI test launch silos. Minor internal modifications would be required to accommodate the NGI, such as mechanical, electrical, and logical interface work. No major internal redesign, demolition, or structural modifications would be required. The ground area surrounding the silo would also potentially require reinforcement to support the heavier interceptors and transport equipment. These external modifications could include removal, replacement, and/or reinforcement of the existing asphalt/concrete and subsurface. Any excavation would be limited to the existing footprint, and no new ground disturbance would be required. No external work is planned for the silo or silo canister.
- Because no warehousing space is currently available on VSFB for the NGIs, an off-base storage location(s) would be required. Modifications to the off-base storage warehouse(s), which would be an existing facility or facilities, could include minor electrical, security, and mechanical work.

Facility modification at VSFB could begin as early as 2024. At peak, approximately 20 personnel and several pieces of heavy equipment (e.g., trucks, cranes, backhoes, post bore trucks, diesel generators) would be present at VSFB during the site preparations phase of the Proposed Action. Any modification, removal, replacement, or installation of cooling systems (e.g., air conditioning, refrigeration) would comply with applicable federal and state refrigerant regulations and would include updating of VSFB's Air Program Information Management System (APIMS) refrigerant-tracking database.



Data Source: World Imagery; World Street Map

Figure 2.1-2. Location of Proposed Facilities to be Modified – VSFB

2.1.2.2 Fort Greely, Alaska

Space and operational constraints at FGA may require the construction of additional facilities to accommodate the NGI. This EA/OEA evaluates the potential use and modification of existing facilities as well as the potential need for additional facilities. The Proposed Action would require the use of existing facilities and possible construction of new facilities at FGA, as shown in **Table 2.1-4** and **Figure 2.1-3**.

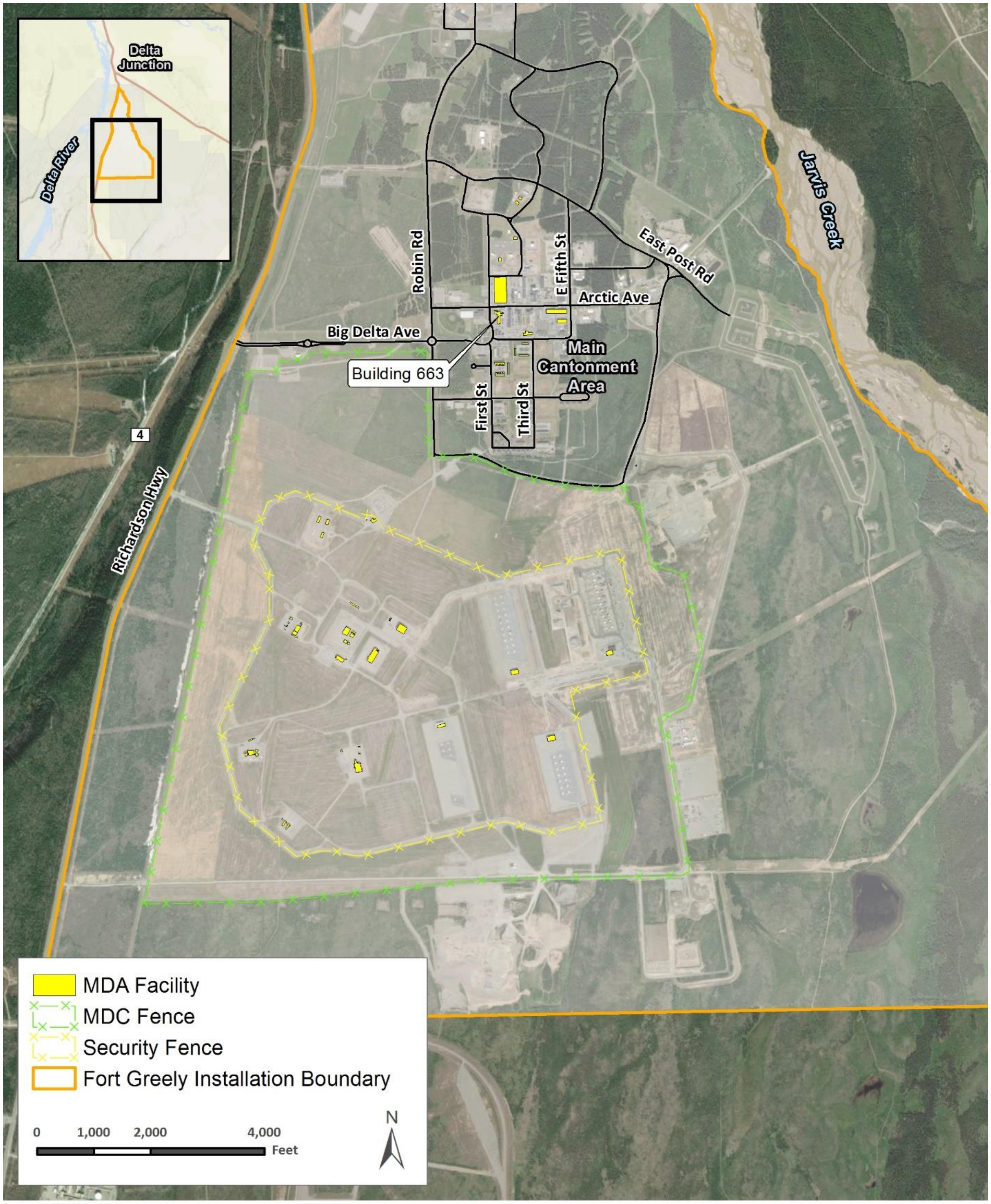
Table 2.1-4. Existing and Potential New Facilities Proposed for Use at FGA

Facility Function	Potential Locations
Interceptor Silos	Existing GMD silos
Readiness Station	Building 3001 or FGA Communication Center (under construction)
SATCOM	Building 3301
In-Flight Interceptor Communication System Data Terminal (IDT)	Buildings 3201 (IDT-1), 3202 (IDT-2), and 3210 (IDT Support Center)
Assembly, Integration, and/or Checkout	Missile Assembly Building (MAB) 3110 or new MAB
Interceptor Storage	Buildings 3401 (Interceptor Storage Facility [ISF] -1) and 3402 (ISF-2); or new ISF.
NGI Transporter Storage	Building 658 or MDC Maintenance Support Facility (currently in design)
Payload Storage	Building 3401 (ISF-1), Building 3402 (ISF- 2), Building 3120 (KV Fuel Storage), Building 3121 (KV Oxidizer Storage); or new payload fueling facility, new KV oxidizer storage facility, and new KV fuel storage facility
Warehouse and Maintenance Storage	Building 658, 601, 338, 339, 512, 514, or MDC Maintenance Support Facility (currently in design)
Administrative/Office Space	Building 663, 656, 652, 601, or MDC Maintenance Support Facility (currently in design)

Building 663, located on the cantonment area, may be modified to accommodate NGI personnel. No other modifications to existing facilities at FGA, other than to the GMD silos, are expected to be required to accommodate NGI. The silos modifications would involve minor internal modifications and potential reinforcement to the ground area surrounding the silo. Any excavation would be limited to the existing footprint of the facility, and no new ground disturbance would be required. No external work is planned for the silos or silo canisters.

All new facilities would be constructed inside the current MDA MDC footprint. If required, a new NGI Missile Assembly Building (MAB) would likely be constructed adjacent to the current MAB. Likewise, if required, the new NGI KV oxidizer storage facility and NGI KV fuel storage facility would likely be constructed adjacent to the current oxidizer and fuel storage facilities. This would allow for the possibility of the facilities being joined together and would facilitate the permitting process; increasing the allowed net explosive weight for an existing facility is often easier than obtaining the approvals for a new stand-alone facility. If required, new NGI Interceptor Storage Facilities (ISFs) would be located near the current ISFs but would likely be stand-alone structures.

Modifications to the GMD silos and Building 663 and new facility construction at FGA could begin in 2026. At peak, approximately 20 personnel and several pieces of heavy equipment (e.g., trucks, cranes, backhoes, post bore trucks, diesel generators) would be present at FGA during the site preparations phase of the Proposed Action.



Basemap: World Street Map; World Imagery

Figure 2.1-3. Location of Proposed Facilities to be Modified/Constructed – FGA

2.1.3 Testing

The proposed NGI would be tested at the existing GBI test facilities at VSFB. The testing phase would include transportation of the NGI to VSFB; assembly, integration, and checkout prior to testing (if required); ground testing; and flight testing, which also includes all pre- and post-flight activities. Ground tests and flight tests would be conducted at VSFB. Up to three flight tests of NGI AURs could be conducted from VSFB each year beginning as early as 2026.

2.1.3.1 Transportation

The NGI contractor would be responsible for delivery of the NGI from contractor facilities. It is anticipated that NGI boosters, payloads, and support equipment or preassembled interceptors would be transported in military aircraft, such as a C-17, from military airfields such as Redstone Arsenal, Alabama, to VSFB. VSFB has an established airfield that would be used for receiving the NGI. The NGI could also be transported by ground for part or all the distance to VSFB. Ground transport would occur using the Interstate Highway System for the greatest extent possible. Shipping would be conducted in accordance with applicable DAF, Federal Aviation Administration (FAA), and/or Department of Transportation (DOT) regulations, and all required permits would be obtained.

A specially designed missile transporter would be used to transport the NGI. The transporter design is still in development, but it is expected to include an eight- to ten-axle trailer and four-axle tractor, be up to 100 feet in length and 12 to 14 feet in width and have an unloaded weight of approximately 120,000 to 140,000 pounds. When fully loaded, the missile transporter would weigh between 270,000 and 300,000 pounds (loaded weight includes the NGI and ballistic protection). A state DOT heavy load and oversized load permit would be required if the transporter is driven on public roads.

The missile transporter would be used to unload the NGI from the C-17 and for all ground transportation on VSFB. All movement of NGIs on VSFB would be pre-coordinated and approved.

Applicable safety regulations would be followed in the transport, receipt, storage, and handling of hazardous materials, which includes the booster’s class 1.3 HTBP solid propellant and the payload propellant.

2.1.3.2 Assembly, Integration, Checkout, and Storage

NGIs could be assembled and integrated at VSFB, or preassembled interceptors could arrive on-site. If unassembled components are delivered, the components would be placed in Building 1555 or 1819 for assembly, integration, and checkout. Interceptor checkout includes procedures and functional tests specific to the components to determine whether all parts of the interceptor are capable of performing their prescribed functions. For NGI, it would be performed in the integration and assembly buildings and would include visual inspections and diagnostic testing. Assembly operations would include integration of the payload with the booster; final inspections, testing, and checkout of the interceptor; and placement of the interceptors into the storage bunkers or emplacement into silo(s).

If preassembled interceptors arrive at VSFB, they could be placed in Building 1555 or 1819 for verification testing, placed in storage bunkers, or emplaced directly into a silo(s). Interceptors could also be stored temporarily in the missile transporter. The missile transporter would be designed to safely accommodate extended storage, although extended storage is not planned. It would be climate controlled with leak protection and detection systems, and would include a generator, winch, hydraulics, and ballistic protection comparable to an ISF. Normal operations would require the interceptor to be held in the missile transporter only for the few days required to transport the interceptor from the airfield or integration and assembly buildings to a silo or ISF.

An appropriate explosive safety quantity-distance (ESQD) zone[3] would be established around facilities where AUR and propellant are stored or handled in order to account for the possibility of an unplanned event. Such an event would be characterized either as an explosion of the missile propellants or as the propellants burning without an actual explosion. All ESQD zones would be approved by the DoD Explosives Safety Board. Applicable safety regulations would be followed in the transport, receipt, storage, and handling of hazardous materials, which includes the booster's class 1.3 HTBP solid propellant and the payload propellant. Additionally, storage and handling of all hazardous substances would comply with the Emergency Planning and Community Right-to-Know Act and would follow all installation procedures for reporting.

2.1.3.3 Ground Testing

Ground testing would occur at VSFB after delivery and, if necessary, assembly of the interceptors. Elements of ground and verification testing could also occur at other existing contractor commercial facilities prior to the transfer of the NGI to the MDA.

Objectives of ground testing would include proof of:

- Handling of boosters, payload, and subsequent components;
- Concept of operations;
- Physical interfaces with the silos and range at VSFB; and
- Maintenance procedures.

For the ground test events, the NGI would have an inert payload with ionized water used to simulate fuels. Test equipment, similar to what is currently used for the GBI, would be used in the integration facility for checkout following assembly (if required). The test equipment would consist of the hardware and software to receive telemetry and simulate interfaces, messages, and signals from ground electronics systems.

The NGI transporter would move the inert test NGI to either LF-23 or LF-24 prior to the test events. A mobile crane would be used for emplacement to demonstrate tooling and emplacement processes and procedures. The NGI would not be electrically connected to the silo for the ground test events and would not be launched. Modifications to the silos and silo areas could happen during the ground testing phase, although none are currently planned until the flight test phase.

2.1.3.4 Flight Testing

Flight testing provides measurements of the effectiveness of a missile against countermeasures and the lethality of the KVs. NGI flight tests would be planned, approved, and executed to achieve certain Missile Defense System system-level and element-level test objectives. Up to three flight tests of NGI AURs per year could be conducted from VSFB, beginning as early as 2026.

Previous NEPA documentation for the GBI flight test program included approximately three target launches and two GBI booster verification launches per year from north VSFB (USASMDC 2003). GBI testing would conclude prior to commencement of the NGI test program; consequently, the Proposed Action would result in a net decrease in the annual number of launches occurring from VSFB.

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[3] The ESQD zone surrounding explosive materials is calculated using DoD Standard 6055.9, *Ammunition and Explosives Safety Standards*, and considers factors such as the hazard classification of the explosive and actual test results for that explosive.

This section describes the general characteristics of the proposed NGI flight tests, which would be the same as previous GBI flight tests. The flight tests would consist of single and dual interceptor launches fired to intercept one or multiple ground- or air-launched targets over the Pacific Ocean. The flight test scenario described in this EA/OEA is intended to be representative of an NGI flight test that could be conducted and is not meant to be inclusive or exclusive of other testing possibilities or launch trajectories. However, the flight test scenario is presented with sufficient detail to analyze the environmental impacts from the range of potential NGI flight tests.

The Launch Control Center in Building 1768 would be used to control the NGI countdown and launch. GMD and VSFB Ground Safety personnel would operate the launch consoles. Approximately 20 people would be on site at the Launch Control Center during preparations for 2 weeks prior to the launch and through the launch. Three to four additional personnel above current staffing levels would remain at the Launch Control Center throughout the flight test campaign.

2.1.3.4.1 Pre-Flight Activities

Pre-launch preparations include the routine maintenance of firebreaks around LF-23 and LF-24. Shrubby and woody vegetation within at least 150 feet of the launch pads is cleared to reduce the potential for wildfire.

Approximately 2 weeks prior to the flight test, the AUR(s) would be moved in the missile transporter to LF-23 and/or LF-24 and placed into the silo(s). After placement, range operators would ensure that all missile range systems, communication, and utilities function properly. Applicable safety regulations would be followed in the transport and handling of hazardous materials. An appropriate ESQD zone would be established and maintained around facilities where AURs and propellant are stored or handled in accordance with all applicable federal, state, local, and DAF regulations.

All launch activities would be planned in accordance with Range Safety Requirements. SLD 30 personnel would conduct a comprehensive safety analysis to determine specific launch and flight hazards for each flight test. A standard dispersion computer model for both normal and aborted launch scenarios would be run by installation safety personnel. As part of the analysis, risks to off-installation areas and non-participating aircraft, sea vessels, and personnel would be determined. The results of the analysis then would be used to identify the flight clearance areas, including the launch hazard area, expended booster drop zones, debris impact areas, terminal hazard areas, and flight termination boundary (**Figure 2.1-4**). Once they are defined, the Range Safety Officer would communicate the extent of the clearance area(s) and the time and date of the flight test to the FAA, the U.S. Coast Guard (USCG), and appropriate emergency management agencies for assistance in the clearance of designated areas prior to launch.

Launch Hazard Area

Before a flight test, the Range Safety Officer would determine if the missile(s) could be safely launched from the proposed location. To do this, the Range Safety Officer would develop a Launch Hazard Area around the proposed launch site. The Launch Hazard Area is the area that could be affected by pieces of missile debris should an explosion occur just above the launch pad or in the event that the missile's flight must be terminated in the early flight phase. This Launch Hazard Area would be cleared of all but mission-essential test personnel during launch operations. In addition, a launch caution corridor, which is an area limited to essential personnel, and an impact line, demarcating the protection line for all non-mission-essential personnel, would be established.

Booster Drop Zones and Debris Impact Areas

When a missile flight test is planned, there are certain areas where missile components and debris are expected to fall following a successful intercept. These are the booster drop zones and debris impact areas, which are defined and verified safe as part of the test plan (**Figure 2.1-4**). These clearance areas are defined to encompass the maximum probable distribution of debris or impact points of missile components. The areas are defined by modeling that predicts what the missile may do in a number of situations and incorporates a number of variables such as the missile mass, velocity, trajectory, altitude, and descriptions of the environment that may affect the missile in flight, such as surface and high-altitude winds. For the proposed NGI tests, the booster drop zones and debris impact areas are all expected to fall within the BOA (**Figure 2.1-5**).

Terminal Hazard Areas

In the event of a failed interception, flight termination, or test mishap, the target missile(s) and/or interceptor(s) would continue on their flight paths and terminate in predesignated and verified cleared areas in the Pacific Ocean. Missile components would not be recovered and would be expected to sink. For the proposed NGI tests, the terminal hazard areas would be within the BOA.

Flight Termination Boundary

Another component of flight safety is based on the possibility of a flight termination after the missile has exited the vicinity of the launch pad. A flight termination boundary along the missile flight path would be predetermined, should a launch malfunction or a flight termination action occur. The flight termination boundary defines the limits at which command flight termination would be initiated to contain the missile and its debris within predetermined hazard and warning areas, thus minimizing the risk to test support personnel and the general public. Non-essential mission personnel would be excluded from the flight termination boundary during launch operations. Flight paths are designed to avoid inhabited areas. For the proposed NGI tests, the flight path and thus the flight termination boundary are expected to be entirely over the Pacific Ocean following the interceptor's departure from the launch pad.

Safety Communication Procedures

Once a test event is scheduled, there would be a standard sequence of notification and coordination procedures between the Range Safety Officer and the agencies that would enforce the clearance of land, air, and sea areas.

Prior to each flight test, the Flight Safety Analyst would define which airspace areas would be affected, and the Chief of Range Operations would coordinate with the FAA and the USCG to address any issues of concern. Air traffic would be rerouted from clearance areas or rescheduled during the launch window. Local Notices to Mariners (NOTMARs) and Notices to Air Missions (NOTAMs) would be issued in the region of the flight test. The DAF notifies oil rig companies of an upcoming launch event 10 to 15 days in advance of a launch operation. The DAF's notification, provided through the Department of the Interior's Minerals Management Service, requests that the oil rigs located in the path of the launch vehicle overflight temporarily suspend operations and evacuate or shelter their personnel. Other areas such as shipping lanes would be cleared in accordance with existing VSFB standard operating procedures (SOPs). Flight Test Operators would adhere to health and safety SOPs for the launch.

Depending on the planned launch trajectory, range safety procedures may require the closure of Point Sal State Beach. Beach closures would typically be for less than 1 day. SLD 30 may also coordinate and monitor any train traffic passing through the installation. These actions are considered routine at VSFB and are dictated through SOPs (DAF 2004, DAF 2006, DAF 2010, DAF 2021).

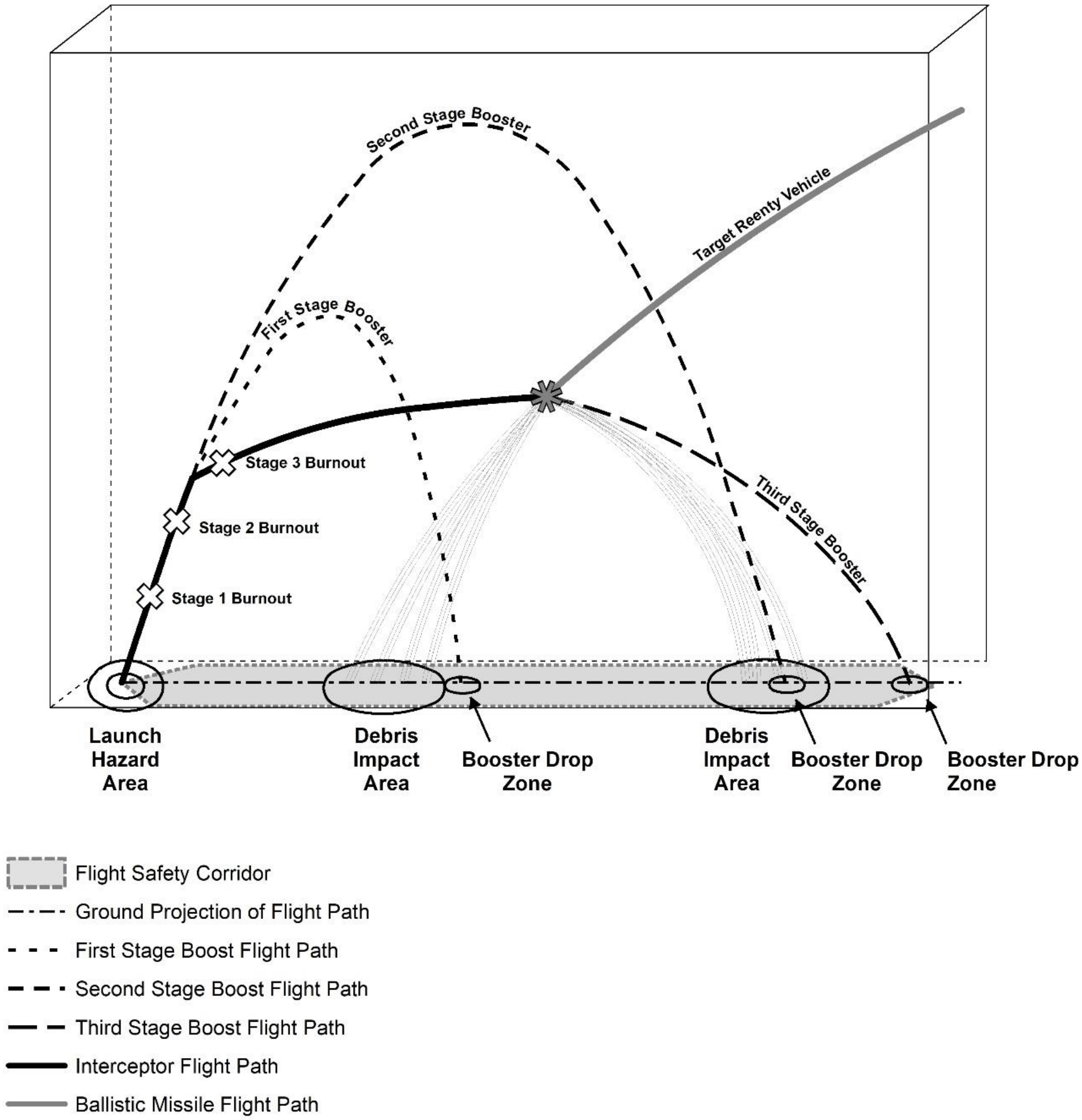

Figure 2.1-4. Notional Flight Operations

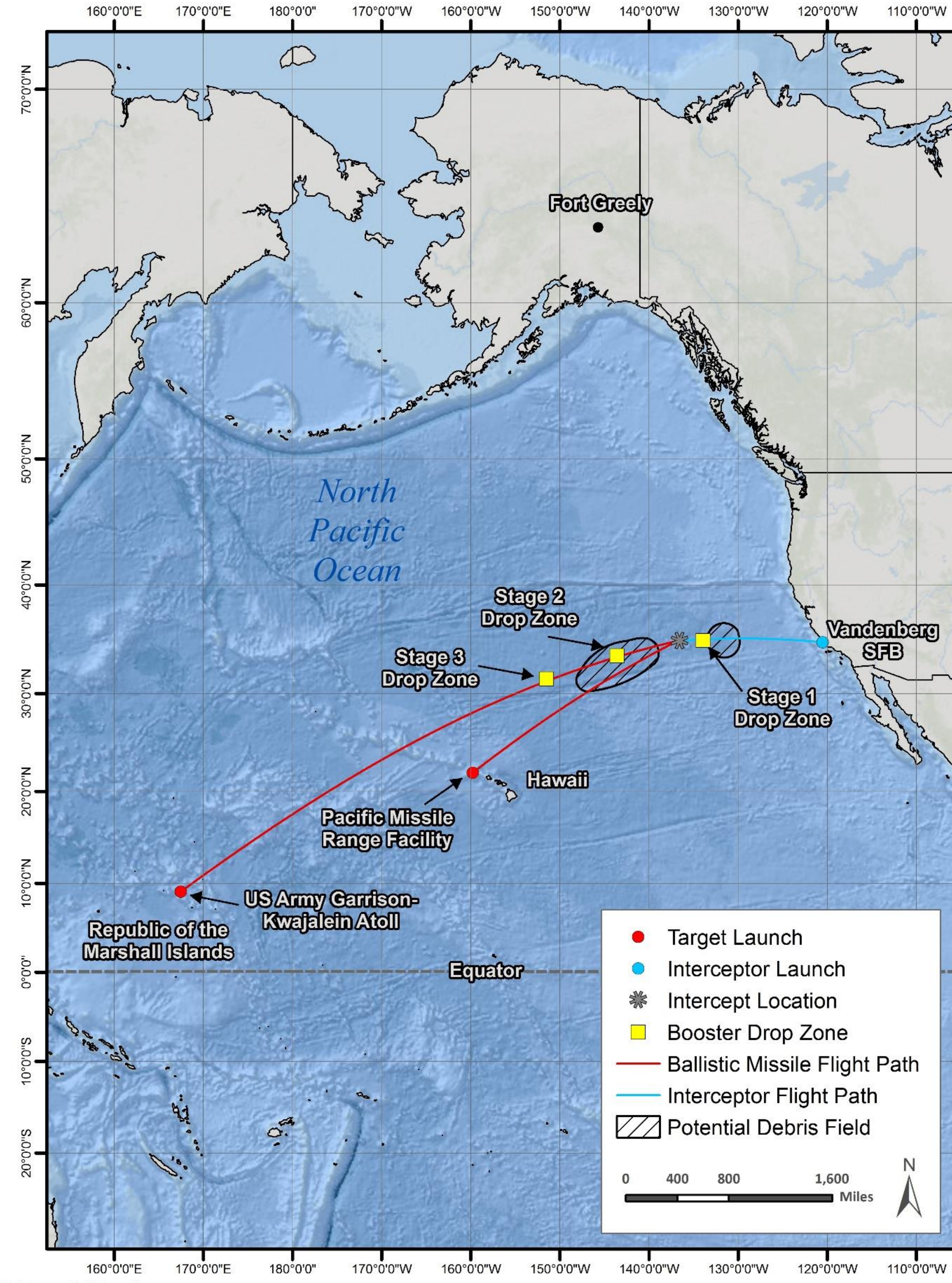

Figure 2.1-5. Notional Flight Trajectories and Potential Debris Fields in the BOA

2.1.3.4.2 Test Launches of NGI AURs

Planned flight tests would demonstrate engagement firings of one NGI AUR against a target missile, and salvo engagement firings of two NGI AURs against a single or multiple target missile(s). Targets would include air-launched intermediate range ballistic missiles (IRBMs) and ground-launched ICBMs. Flight tests would be similar to previous and ongoing tests of the GBI.

NGI AURs would be launched from LF-23 or LF-24, which have approved azimuth boundaries of 264–286 degrees. The azimuth is limited to ensure that potential missile failure would not result in debris outside the azimuth boundary. Final launch azimuth boundaries would be established after all vehicle performance data and areas of endangerment are reviewed and flight termination system requirements are established.

The duration of a typical flight test would be approximately 20 to 30 minutes. Airspace surveillance procedures would last as little as 45 minutes, or as long as 3.5 hours if the test were delayed, after which it would be rescheduled.

A target missile(s) would be launched on an easterly flight path. The first stage would burn out and fall within the predicted booster impact area. The second and third stages, if present, would perform in similar manners, and the target missile(s) would climb out of the atmosphere and into space. The target(s) would reenter the atmosphere and decelerate until it is intercepted or lands in the Pacific Ocean.

Tracking radar would acquire and track the target missile(s) while the NGI command and control system would compute the best time to launch the interceptor. The NGI AUR would then be launched. After launch, the interceptor would slowly gain speed in the first few seconds of flight, then rapidly accelerate out of sight and earshot. Approximately 1 minute into flight, the interceptor would be at an altitude of 30 miles and approximately 40 to 50 miles downrange. The first stage would burn out and fall away. The second and third stages would ignite, and the interceptor would continue toward the intercept point. After burnout, the second and third stages would fall into the ocean. All booster stages would be programmed to land within the predetermined and verified clear booster impact areas in the Pacific Ocean. The KV(s) would be deployed after third-stage burnout and collide with the target missile, destroying it on impact. Intercept altitudes could vary from approximately 60 to more than 155 miles.

Intercept debris is the result of the collision between the target missile descending on its reentry trajectory and an interceptor moving horizontally or in a slight descent toward the target. For the most part, the target missile debris would continue downward, along the path toward its intended impact point within a predetermined debris impact area. Similarly, the interceptor debris would continue along its path into the ocean within another predetermined debris impact area. The most likely outcome of a successful intercept would be a few large pieces (tens of pounds), more medium-size pieces (less than 2 pounds), and mostly small pieces of missile debris (less than 0.5 ounce). Following a successful intercept, debris would be expected to sink and would not normally be recovered from the Pacific Ocean.

If an intercept is not successful, the KV(s) would reenter the atmosphere and would be anticipated to burn up on reentry. Both the target and interceptor missiles would fall into the Pacific Ocean within designated terminal hazard zones. Under normal conditions, missile components would not be recovered from the ocean.

Blast residue generated by the NGI flight tests at the launch pad would be contained within the silo and canister. The blast residue would be removed, containerized, and properly disposed of as hazardous waste according to local, state, and federal regulations.

2.1.3.4.3 Target Missiles

IRBM targets would be air launched by aircraft flying from Joint Base Pearl Harbor-Hickam in Pearl Harbor, Hawaii, or staged from Pacific Missile Range Facility (PMRF) Barking Sands, on Kauai, Hawaii. ICBM targets would be ground launched from Ronald Reagan Ballistic Missile Defense Test Site, located at the USAG-Kwajalein Atoll in the Republic of the Marshall Islands (**Figure 2.1-5**). The target missile(s) would consist of a single reentry vehicle, a guidance and control unit, one to three solid fuel boosters, and an aft skirt assembly.

Target missiles could also house optical sensors, guidance and control electronics, radio transmitters and receivers, a power supply (possibly including lithium, nickel-cadmium, or other types of batteries), or a payload section for simulated biological or chemical munitions (simulants) or decoys. The purpose of using simulants in target missiles would be to assess the effectiveness of NGI interceptors against threat missiles carrying chemical and biological agents as payloads. The use of simulants is considered the best available and most practicable approach to obtain required data for testing BMDS effectiveness.

NGI element test activities associated with the MDA lethality program may include development and testing of nuclear, biological, or chemical (NBC) material simulants within a laboratory or other indoor and outdoor test facilities. Testing could involve the use of simulated environmental conditions and simulated NBC agents to determine how each material would react to stresses expected from a typical engagement. The simulant would serve as a substitute for live chemical, biological, and bulk payloads, and would mimic the significant qualities of the NBC agent for test purposes. Simulants could include water, tri-butyl phosphate, or diatomaceous earth. No live NBC agents would be used during flight test activities.

The IRBM and ICBM target missiles used in the proposed NGI flight tests would be within the Flexible Target Family (FTF). The FTF consists of common missile boosters, front sections, and components that can be used to assemble a variety of different target configurations. The MDA analyzed the preparation, assembly, integration, testing, transportation, and use of FTF missiles in the *Flexible Target Family Environmental Assessment* (MDA 2007a). Air and ground launches of test missiles to support the NGI flight test are summarized in the following sections. The MDA made a FONSI with respect to the FTF in support of BMDS testing (MDA 2007b).

<u>Air-Launched IRBM Targets</u>

In its largest configuration, target IRBM missiles would be approximately 48 feet long with a maximum diameter of approximately 5 feet and would weigh approximately 22,000 pounds.

Air launch of solid-propellant IRBM targets would be from a contractor- or government-supplied C-17 cargo aircraft. No air launches of liquid propellant targets would occur. Air launch staging activities at both Hawaii locations would be similar. Following arrival of the target shipment at the appropriate staging location, the solid propellant target would be secured to the pallet and final functional tests would be performed. Pre-launch staging activities are considered routine at both Joint Base Pearl Harbor-Hickam and PMRF.

Following takeoff from the airport, the C-17 would fly to a predetermined drop point over the BOA. At the designated altitude, the aircraft aft door would be opened, and the palletized target missile would be extracted from the aircraft. After descending by parachute to an altitude of approximately 20,000 feet above mean sea level, explosive cutters would sever the straps holding the missile to the pallet, allowing the target to fall away. The pallet and parachute would sink into the ocean and not be recovered. Following its separation from the pallet, the first stage booster would ignite, and the target would begin its trajectory toward VSFB. The flight path of the target missile would be determined as part of the test plan, and all clearance areas associated with the target missile flight would be defined (e.g., the flight corridor, booster drop zones, and terminal hazard area).

Ground-Launched ICBM Targets

The ICBM-class target would consist of a three-stage, solid-propellant vehicle. At its largest configuration, target ICBM missiles would be approximately 75 feet long with a maximum diameter of approximately 7 feet, would weigh approximately 125,000 pounds, and would contain approximately 84,000 pounds of hazard class 1.1[4] and 1.3 solid propellant.

Preparation and launch of an ICBM class target from Ronald Reagan Ballistic Missile Defense Test Site was previously analyzed by the MDA in the FTF EA (MDA 2007a). Flight test activities for the ICBM-class target described in the EA include transportation of booster stacks from Kwajalein Island to Meck Islet, short-term storage of the target, pad setup, final integration and testing of the target, clearing of the range area, and other range requirements prior to launch, as appropriate. Launch activities would consist of the launch and flight of the target, beginning with first-stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept, and debris generation. Post-launch activities would consist of debris cleanup including minor refurbishment of the launch stand and transport of the support equipment to the appropriate storage facility.

2.1.3.4.4 Post-Flight Activities

Minor maintenance would occur at the LFs after a test flight to ensure that the facilities would be operational for subsequent tests. Post-flight procedures would include silo inspection, removal of blast residue, and minor silo refurbishing including minor touch-up painting on the top side of the silo. Approximately 20 personnel would be at the launch site for inspection, canister removal, silo brush down, and refurbishing.

2.1.4 Deployment and Operation

This phase would include the deployment of tactical interceptors to VSFB and FGA and their subsequent operation. Operation refers to long-term facility operation, including initial testing of the system once the tactical interceptors are emplaced and maintenance of an on-alert system. This EA/OEA does not consider potential use of the interceptors for active national defense.

The current plan is for the NGI to update and enhance the current GBIs at VSFB and FGA. A decision has not been made on whether to replace the GBIs in the future. Exact GMD system needs are fluid at this time. GBI decommissioning is not currently planned and would be analyzed in a subsequent tiered NEPA analysis, if necessary.

2.1.4.1 Vandenberg Space Force Base

Transportation of the NGI to VSFB for deployment would be the same as discussed in **Section 2.1.3.1**. Although a decision has not been made, up to four interceptors could be emplaced at VSFB.

Assembly, integration, and checkout activities and storage options during the deployment and operation phase would be the same as those described for the testing phase in **Section 2.1.3.2**.

[4] Division 1.1 consists of explosives that have a mass explosion hazard. A mass explosion is one that affects almost the entire load instantaneously (49 CFR Part 173.50(b)(1)).

2.1.4.2 Fort Greely, Alaska

The MDA expects that all NGI shipments to FGA would be by air using military aircraft, such as a C-17. NGI boosters, payloads, and support equipment or preassembled interceptors would be transported in specialized containers and shipped in accordance with applicable DAF, DA, FAA, and DOT regulations. FGA has an established airfield that would be used to receive the NGI.

The specially designed missile transporter described in **Section 2.1.3.1** would be used for ground movement and transport of the NGI at FGA. These movements would include transition from the airfield to the MDC MAB, ISFs, or silos. The unloaded transporter may be flown to FGA or driven through Canada prior to NGI deployment. All state DOT and Transport Canada permits would be obtained for ground transport of the missile transporter.

Applicable safety regulations would be followed in the transport, receipt, storage, and handling of hazardous materials, which includes the booster's class 1.3 HTPB solid propellant and the payload propellant.

After receipt of the NGI, any needed assembly, integration, and checkout would occur in the current MAB or a new NGI MAB. These activities are similar to those described for VSFB in **Section 2.1.3.2**. Once the AURs are verified, they would be transported to the silos for emplacement or placed in an existing ISF.

2.2 No-Action Alternative

Under the No-Action Alternative, NGI would not be tested, deployed, and operated. NGI launch facilities at VSFB and FGA for initial defensive operations would not be established. VSFB and FGA would continue with normal activities including launching missiles as analyzed in prior environmental documents listed in **Section 1.8**. By choosing the No-Action Alternative, the MDA would not plan for or use the NGI to enhance the defense of the U.S. against the threat of a limited strategic ballistic missile attack.

2.3 Siting Alternatives

The existing GMD GBI test location is VSFB. The necessity to utilize existing GMD infrastructure and procedures limits the test location for NGI to VSFB. The current deployed locations for the GBI at VSFB and FGA are threat-driven. With the intent of the NGI to update and enhance the current GBIs, the locations for the deployed NGIs could be VSFB and FGA. GMD system needs are fluid at this time and a decision to replace GBIs has not been made. There is a potential to replace them in the future. Deploying the NGI to these locations also maximizes the potential to utilize existing infrastructure. Alternative sites could have been considered, but they would not be reasonable given the existing infrastructure and national security needs of these locations. Thus, there are no other reasonable action alternatives that meet the purpose and need.

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3.0 Affected Environment

This section describes the existing environment at VSFB and FGA, as well as the BOA in the Pacific Ocean. Existing information on the affected environment is summarized in this EA/OEA with the purpose of evaluating the effects of the Proposed Action and in proportion to the magnitude of potential effects.

In compliance with NEPA, CEQ regulations, and DAF and DA environmental impact analysis process regulations and guidelines, this EA/OEA focuses only on those environmental resources considered potentially subject to impacts from the Proposed Action. Because different activities are proposed for each geographic area (i.e., VSFB, FGA, and the BOA), the resources for which detailed analyses were conducted vary by location. The following sections also list the resources considered but removed from analysis for each location, along with the justification for removing them from further consideration.

3.1 Vandenberg Space Force Base

At VSFB, air quality and climate variability, biological resources, coastal zone management, cultural resources, hazardous materials and hazardous waste management, health and safety, noise, socioeconomics and environmental justice (EJ), and water resources are the environmental resource areas of concern requiring discussion. Airspace management, geology and soils, land use, infrastructure (utilities), transportation, and visual resources were not analyzed further because negligible impacts to these resources would be anticipated as a result of implementing the Proposed Action at VSFB.

The Proposed Action is well within the limits of current operations and permits of the installation, and thus there would be no effects on land use. No new buildings or facilities would be constructed for the Proposed Action at VSFB, and modifications to existing facilities would have negligible impacts on utility systems, including electrical power, natural gas, potable water, and wastewater management. All site preparations, including silo modifications, would occur in previously developed and/or disturbed areas and would not alter the current landscape; therefore, no impacts to geology and soils or visual resources would be expected.

Short-term, negligible, adverse impacts on transportation and traffic are anticipated during the site preparation and flight-testing phases at VSFB due to the presence of construction and support personnel, and from potential temporary delays to local train and road traffic during test flights. It is anticipated that transportation of the NGI components or preassembled AURs to VSFB would occur via military aircraft, but the NGI could also be transported by ground via the Interstate Highway System. Shipping would be conducted in accordance with all applicable regulations, and all required permits would be obtained. The missile transporter would also be expected to be transported via military aircraft, but an unloaded transporter(s) could be driven to VSFB via the Interstate Highway System. All required permits to drive the oversize and overweight transporter would be obtained. Traffic in the immediate wake of the transporter may be temporarily slowed. These impacts would be localized, short-term, and negligible.

Short-term, negligible impacts on airspace at VSFB and downrange over the Pacific region would occur under the Proposed Action. Airspace impacts from missile testing activities at VSFB have been described and analyzed in earlier EAs, including the Theater Ballistic Missile Targets Programmatic EA (DAF 1997), Booster Verification EA (DAF 1999), and Alternate Boost Vehicle Verification Test EA (USASMDC 2002a). These documents concluded that close coordination with the FAA would result in no adverse effects to airspace from missile flight tests. Consistent with previous and ongoing launches from VSFB, NGI flight tests would be conducted in accordance with established FAA, DoD, and DAF navigation and airspace safety policies and procedures. Close coordination with the Los Angeles Air Route Traffic

Control Center (ARTCC) by the launch operations manager, the ability of VSFB to schedule restricted airspace over the installation and ocean range, and existing range safety and notification requirements would minimize potential impacts on the use of airspace by general aviation during launches. Prior to each flight test mission, a NOTAM would be published to divert commercial and private aircraft from any hazard areas along the missile flight path. The launches would be infrequent, short-term events, after which the airspace would be returned to the control of the Los Angeles ARTCC. Apart from flight tests required by the NGI program, no additional impacts to airspace would be anticipated. Therefore, airspace is not carried forward as a resource area requiring further analysis.

3.1.1 Air Quality and Climate Variability

Air quality at VSFB has been thoroughly documented in previous assessments, most recently in the Final GBSD Test EA/OEA (DAF 2021).

3.1.1.1 Applicable Regulations

Under the Clean Air Act (CAA), the U.S. Environmental Protection Agency's (USEPA) Office of Air Quality Planning and Standards (OAQPS) is responsible for setting emission standards, also known as National Ambient Air Quality Standards (NAAQS), for pollutants that are considered harmful to people and the environment. OAQPS is also responsible for ensuring that these air quality standards are met or attained (in cooperation with state, tribal, and local governments) through national standards and strategies to control pollutant emissions from automobiles, factories, and other sources. There are two types of NAAQS standards, primary and secondary. Primary standards protect against adverse health effects; secondary standards protect against welfare effects such as damage to farm crops and vegetation and damage to buildings. The six criteria pollutants addressed in the NAAQS are carbon monoxide, nitrogen dioxide, lead, ozone, particulate matter less than or equal to 2.5 microns and 10 microns in diameter ($PM_{2.5}$ and PM_{10}), and sulfur dioxide. If the levels of these pollutants are higher than the NAAQS, the area in which the level is too high is called a nonattainment area. Areas where pollutant levels are within the standards are called attainment areas. Areas where pollutants had exceeded the standards but are now within the standards and less than 20 years has passed since achieving compliance are called maintenance areas. Individual states may establish ambient standards that are more stringent than the NAAQS, although attainment of the NAAQS has precedence over attainment of state standards due to federal penalties for failure to meet federal attainment deadlines. **Table 3.1-1** summarizes the NAAQS.

Table 3.1-1. National Ambient Air Quality Standards

Pollutant	Primary/Secondary	Averaging Time	Level
Carbon Monoxide (CO)	Primary	8 hours	9 ppm
		1 hour	35 ppm
Lead (Pb)	Primary and Secondary	3-month average	0.15 μg/m^3
Nitrogen Dioxide (NO_2)	Primary	1 hour	100 ppb
	Primary and Secondary	1 year	53 ppb
Ozone (O_3)	Primary and Secondary	8 hours	0.070 ppm
Particulate Matter ($PM_{2.5}$)	Primary	1 year	12.0 μg/m^3
	Secondary	1 year	15.0 μg/m^3
	Primary and Secondary	24 hours	35 μg/m^3

Pollutant	Primary/Secondary	Averaging Time	Level
Particulate Matter (PM_{10})	Primary and Secondary	24 hours	150 μg/m^3
Sulfur Dioxide (SO_2)	Primary	1 hour	75 ppb
	Secondary	3 hours	0.5 ppm

Source: 40 CFR Part 50.

Notes: μg/m^3 = micrograms per cubic meter; ppb = parts per billion; ppm = parts per million.

The General Conformity Rule of the CAA requires any federal action in a nonattainment area or maintenance area to meet the requirements of a State Implementation Plan or Federal Implementation Plan. More specifically, CAA general conformity is ensured when a federal action does not cause a new violation of the NAAQS; contribute to an increase in the frequency or severity of violations of the NAAQS; or delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with NAAQS. **Table 3.1-2** summarizes the General Conformity Rule *de minimis* table (40 CFR Part 93.153(b)(1)) as it relates to nonattainment and maintenance areas.

Table 3.1-2. General Conformity Rule *De Minimis* Thresholds

Criteria Pollutant	Nonattainment or Maintenance Area Type	Tons per Year
Ozone (VOC or NO_x) [a]	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other nonattainment and maintenance [b]	100
CO, SO_2, and NO_2	All nonattainment and maintenance	100
PM_{10}	Moderate nonattainment	100
	Serious nonattainment	70
$PM_{2.5}$	All nonattainment and maintenance	100
Lead (Pb)	All nonattainment and maintenance	25

Source: 40 CFR Part 93.153

Notes: CO = carbon monoxide; NO_x = nitrogen oxides; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound.

(a) Volatile organic compounds and nitrous oxides are precursors to ozone.

(b) Outside of Ozone Transport Regions.

Prevention of Significant Deterioration (PSD; 40 CFR Part 52.21) applies to new major stationary sources or major modifications to existing stationary sources for pollutants where the area the source is located is in attainment or unclassifiable with the NAAQS. A major source under PSD regulations is any source that emits or has the potential to emit 100 tons per year (tpy) or 250 tpy of a regulated pollutant, dependent on the source category and attainment status of the area. A PSD increment is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant.

Significant deterioration is said to occur when the amount of new pollution would exceed the applicable PSD increment.

There are other regulations that set standards that certain emissions units must meet, regardless of major or minor source permit requirements. The National Emission Standards for Hazardous Air Pollutants are stationary source standards for hazardous air pollutants. The New Source Performance Standards are also stationary source standards that apply to specific types of newer equipment that are typically moderate to large emitting sources.

3.1.1.2 Existing Conditions

The region of influence (ROI) for air quality consists of the entire air basin surrounding VSFB, which includes San Luis Obispo, Santa Barbara, and Ventura counties. VSFB is located in the South Central Coast Intrastate Air Quality Control Region (AQCR 032; 40 CFR Part 81.166) within the Santa Barbara County Air Pollution Control District (SBCAPCD).

Under the NAAQS, Santa Barbara County is in attainment for all pollutants, however, under the California Ambient Air Quality Standards (CAAQS), the County is in nonattainment for ozone and PM_{10} (SBCAPCD 2023a). **Table 3.1-3** summarizes the applicable CAAQS. In addition, the SBCAPCD General Conformity regulations adopt verbatim the federal General Conformity rules, except for mitigation requirements if they are required.

Table 3.1-3. Applicable California Ambient Air Quality Standards

Pollutant	Averaging Time	Concentration
Ozone (O_3)	1 hour	0.09 ppm
	8 hour	0.070 ppm
Particulate Matter (PM_{10})	24 hour	50 μg/m^3
	Annual Mean	20 μg/m^3

Source: California Code of Regulations Title 17 Section 70200
Notes: μg/m^3 = micrograms per cubic meter; ppm = parts per million.

Emissions of criteria air pollutants are inventoried by the USEPA. **Table 3.1-4** shows Santa Barbara County emissions for 2020 (the most recent year of available data). Emissions in Santa Barbara County are generally decreasing over time, due largely to the implementation of SBCAPCD emission control measures as well as state and federal regulations that control mobile sources (SBCAPCD 2023b).

Table 3.1-4. 2020 Emissions – Santa Barbara County, California (Tons)

Source	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOC	NH_3	CO_2e	HAP
Area [a]	3,965	102	44	4,555	866	1,166	1,826	76,437	242
Stationary	6,852	2,055	114	706	643	35,976	154	-	447
Mobile, On-Road	7,101	1,852	16	246	111	1,002	132	1,927,355	257
Mobile, Non-Road	12,901	1,374	4	115	94	1,739	2	254,288	451
Total	30,818	5,384	179	5,622	1,715	39,882	2,114	2,258,079	1,397

Source: USEPA 2020a
Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent (includes CO_2 and methane); HAP = hazardous air pollutant; NH_3 = ammonia; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound.
"-" indicates that no limit or estimate is determined, or not applicable.
[(a)] *Area-wide sources include fires (wildfires and prescribed burning), agriculture, and dust.*

VSFB is considered a major stationary source of emissions and holds a combined Permit to Operate (PTO; No. 13968-R3) and a Part 70 Operating Permit (No. 13968), last issued in June 2023 (SBCAPCD 2023c). The Part 70 permit incorporates previous Part 70 revisions that have been issued since November 27, 2019. Emissions sources on VSFB include internal and external combustion sources, conventional and exotic fuel transfer and storage operations, abrasive blasting and surface coating operations, and processes involving solvent usage. Mobile source emissions include aircraft, missile, and rocket launch emissions, as well as motor vehicle emissions. It is important to note that mobile sources are typically exempt from permit requirements. **Table 3.1-5** shows the facility's potential to emit, including permit-exempt equipment.

Table 3.1-5. VSFB Annual Federal Potential to Emit

Equipment Category	Pollutant Emissions (Tons per Year)								
	NO_x	ROC	CO	SO_x	PM	PM_{10}	$PM_{2.5}$	GHG (CO_2e)	HAP [a]
External Combustion	4.39	0.39	15.16	1.00	0.54	0.54	0.54	8,424.9	-
Reciprocating IC Engines	13.52	1.03	8.78	0.02	0.50	0.50	0.50	1,634.2	0.26
Turbines	27.01	3.52	33.08	4.11	2.06	2.06	2.06	36,452.1	0.29
Bulk Fuel Storage	-	0.30	-	-	-	-	-	-	0.00
Abrasive Blasting	-	-	-	-	0.31	0.31	0.31	-	0.00
Coating Operations	-	7.33	-	-	-	-	-	-	2.28

Equipment Category	Pollutant Emissions (Tons per Year)								
	NO_x	ROC	CO	SO_x	PM	PM_{10}	$PM_{2.5}$	GHG (CO_2e)	HAP [a]
Solvent Usage	-	4.17	-	-	-	-	-	-	0.63
Gasoline-Dispensing Facilities	-	3.48	-	-	-	-	-	-	0.87
Hypergolic Fuel Storage and Handling	0.22	0.06	-	-	-	-	-	-	-
Permit-Exempt Equipment	78.08	9.21	-	-	11.47	11.47	11.47	29,479.8	-
Boilers [b]	-	-	-	-	-	-	-	-	0.01
Scrubbers [b]	-	-	-	-	-	-	-	-	0.05
Total [c]	123.22	29.48	57.02	5.13	14.88	14.88	14.88	75,990.9	4.38

Source: SBCAPCD 2023c

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent (includes CO_2 and methane); GHG = greenhouse gases; HAP = hazardous air pollutant; IC = internal combustion; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; ROC = reactive organic compounds; SO_x = sulfur oxides. "-" indicates that no limit or estimate is determined, or not applicable.

(a) HAP emissions are computed for informational purposes only. These values are estimates only, not limitations.

(b) These sources were assessed for HAPs independently of the facility's potential to emit, and potential emissions from these sources are assumed to fall within another equipment category, as appropriate.

(c) Totals may not add up due to rounding.

Consistent with EO 13990 – *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, the social cost of the greenhouse gas (GHG) emissions from VSFB has been prepared (**Table 3.1-6**). The social cost of GHGs is the monetary value of the net harm to society associated with adding that amount of GHGs into the atmosphere in a given year. The values presented in **Table 3.1-6** were calculated based on the annual potential to emit GHGs for stationary and mobile combustion sources at VSFB as permitted by the Part 70 Operating Permit (see **Table 3.1-5**) and thus may overestimate the actual GHG emissions from the installation.

The total allowable annual GHG emissions from VSFB, reported in tons per year of carbon dioxide equivalent (CO_2e), were broken down into individual estimates of annual emissions of carbon dioxide, methane, and nitrous dioxide in metric tons per year using emission factors in the USEPA GHG Emissions Hub (USEPA 2023). The social costs of these emissions were then calculated, in 2020 dollars, using the social costs for emissions year 2023 estimated by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG 2021). Based on these calculations, the social cost of GHG emissions from VSFB in 2023 is between approximately $6.3 million and $29 million. The lower value represents the social cost using a discount rate of 5 percent and the higher value is at a discount rate of 2.5 percent. Discount rates account for the change in the value of money over time. A lower discount rate places a greater emphasis on the benefits of avoided emissions to future generations and results in a higher social cost of carbon, whereas a higher discount rate places a greater importance on present benefits relative to future benefits (or impacts) and results in a lower social cost of carbon.

Table 3.1-6. Social Costs of GHG Emissions from VSFB in 2023

Greenhouse Gas	Estimated Total Annual Emissions (metric tons) [a]	2023 Social Cost Rates (in 2020 dollars per metric ton of gas) [b]		Estimated 2023 GHG Social Costs (in 2020 dollars)	
		5% Discount Rate	2.5% Discount Rate	5% Discount Rate	2.5% Discount Rate
Carbon Dioxide (CO_2)	68,007.0	$15.94	$80.34	$1,084,167.06	$5,463,611.70
Methane (CH_4)	106.4	$747.38	$2,119.53	$79,531.99	$225,549.71
Nitrous Oxide (N_2O)	810.5	$6,385.35	$28,800.99	$5,175,038.35	$23,341,911.09
Total	-	-	-	$6,338,737.41	$29,031,072.50

Notes: GHG = greenhouse gas. “-” indicates that no estimate is determined, or not applicable.

[(a)] Estimates of metric tons by gas were calculated from the total CO_2e using the default emissions factors for distillate fuel oil no. 2 (for stationary sources) and for diesel fuel and diesel-powered construction/mining equipment (for mobile sources; USEPA 2023).

[(b)] Annual unrounded estimates for the social cost of carbon, methane, and nitrous oxide (OMB 2021).

3.1.2 Biological Resources

Biological resources at VSFB have been thoroughly documented in previous documents and plans, most recently in the 2021 VSFB Integrated Natural Resources Management Plan (INRMP; USSF 2021) and the Final GBSD Test EA/OEA (DAF 2021).

The ROI for biological resources at VSFB includes the northern half of the installation with particular focus on the area in the vicinity of LF-23 and LF-24, which are located on the northernmost portion of VSFB near Minuteman Beach (see **Figure 3.1-1**). The ROI also includes the ocean area off the coast of VSFB to the limit of the territorial seas (12 nm from the coast)[5] that would be included in the clearance areas for flight tests. Biological resources at VSFB are currently managed under the installation’s INRMP (USSF 2021), which includes descriptions of the vegetation associations, wetland types, fish and wildlife, and federally listed threatened and endangered species present at VSFB.

3.1.2.1 Vegetation

LF-23 and LF-24 are located on a marine terrace in a remote, relatively flat area near Minuteman Beach and north of Shuman Creek. Primary vegetation types in this area are grasslands and central coastal scrub. Vegetation at the LFs, including the firebreak areas outside the fence line, is classified as Developed according to A Manual of California Vegetation (Sawyer et al. 2009) and is composed of sparse coverage of disturbance-adapted species including iceplant (*Carpobrotus edulis*) and grassland tarplant (*Deinandra increscens* ssp. *increscens*). Routine maintenance of firebreaks around the LFs

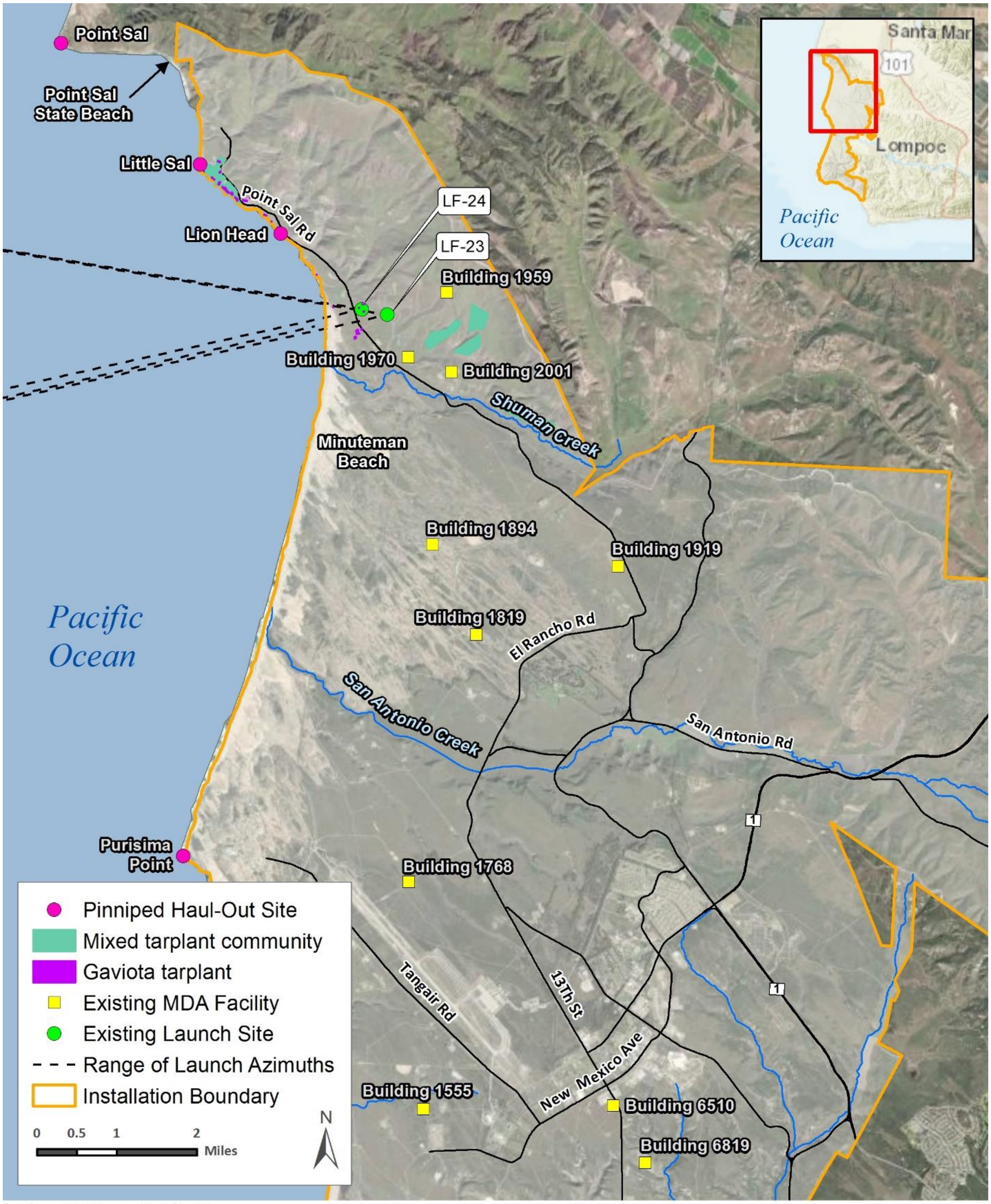
[5] The BOA begins at the limit of the territorial seas (see **Section 3.3**).

minimizes the potential for impacts on vegetation by reducing vegetation exposure and reducing the risk of wildfire. Firebreaks are mowed regularly to manage vegetation height and density.

Habitats between the launch sites and the coast include coastal dunes and beach, a small area of dune swale wetland, and an unnamed intermittent drainage (USFWS 2023; USSF 2021). Dune swale wetlands occur in low-lying areas between the crests of coastal dunes and are important wildlife areas (USSF 2021). The dunes behind Minuteman Beach support a large complex of dune swale wetlands. Primary vegetation types in this area include central coastal scrub, central dune scrub, central coastal arroyo willow riparian forest and scrub, and coastal strand. Descriptions of these vegetation types are provided in 30 CES/CEI 2021.

3.1.2.2 Wildlife

Many resident and migratory animals are present on VSFB. At least 43 species of terrestrial mammals, 10 species of amphibians, and 17 species of reptiles occur on VSFB (USSF 2021). Common species include Western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), Botta's pocket gopher (*Thomomys bottae*), California ground squirrel (*Otospermophilus beecheyi*), deermouse (*Peromyscus* spp.), brush rabbit (*Sylvilagus bachmani*), American badger (*Taxidea taxus*), and mule deer (*Odocoileus hemionus*). At least 253 species of birds have been documented on VSFB and in nearshore environments, and 115 of these species have been known to breed on the installation (USSF 2021). These species include a diversity of seabirds, shorebirds, waterfowl, marshbirds, landfowl, raptors, owls, woodpeckers, hummingbirds, and passerines. At least 20 species of marine mammals are present in the marine waters off the coast of VSFB. California sea lions (*Zalophus californianus*), northern elephant seals (*Mirounga angustirostris*), and Pacific harbor seals (*Phoca vitulina richardii*) are known to haul out along the coastline in the vicinity of the ROI, concentrating at known pinniped haul-out sites at Point Sal, Little Sal, and Lion Head (DAF 2021; **Figure 3.1-1**). A list of all species documented on VSFB is included in **Appendix B** (excerpted from Appendix A of the INRMP [USSF 2021]).



Data Source: World Imagery; World Street Map

Figure 3.1-1. Sensitive Species Habitat in the VSFB ROI

3.1.2.3 Federally Listed Threatened and Endangered Species

The 30th Civil Engineer Squadron Installation Management Flight (30 CES/CEI), which is responsible for implementing the natural resources management program, monitors federally listed threatened and endangered species populations and habitat on VSFB (USSF 2021). One species of endangered plant may occur in the ROI, and five threatened and endangered wildlife species may occasionally occur in nearshore marine habitats within the ROI. Other Endangered Species Act-listed marine wildlife may occur offshore of VSFB within 12 nm of the coast; these species are included in the species present in the BOA (**Section 3.3.1**).

Gaviota tarplant (*Deinandra increscens* ssp. *villosa*; federally listed endangered) is known to occur in the vicinity of LF-23 and LF-24. Gaviota tarplant occurs in grassland habitats on sandy soils associated with marine terraces. Surveys conducted in 2011 documented Gaviota tarplant at 51 locations and identified 10 areas as having mixed populations with individuals that exhibited morphological characteristics of Gaviota tarplant and the common southern tarplant, as well as potential hybrids of these subspecies (SAIC 2012; **Figure 3.1-2**).

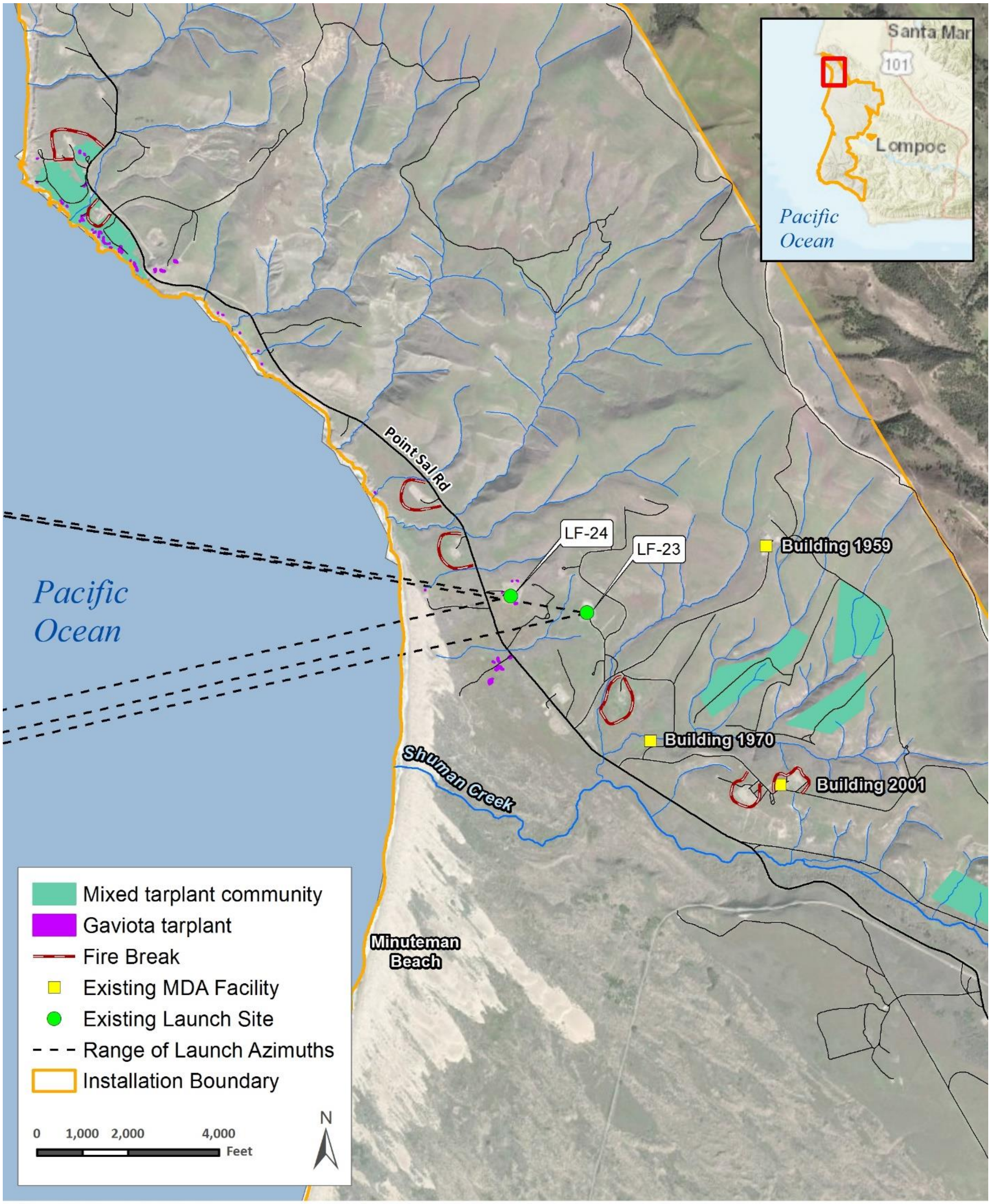
California red-legged frogs (*Rana draytonii*; federally listed threatened) occur in nearly all permanent streams and ponds on VSFB as well as in some seasonal wetlands (USSF 2021). While these frogs breed in waterbodies, juvenile and adult frogs may disperse long distances from breeding sites and have been found up to 400 feet from breeding sites in adjacent dense riparian habitats (USFWS 2015 as cited in USSF 2021). All aquatic and riparian areas within the range of the species are considered suitable habitat for this species as well as any landscape features that provide cover and moisture (USFWS 2015 as cited in USSF 2021). LF-23 is approximately 990 feet from a tributary to Shuman Creek, which provides potential habitat for California red-legged frogs.

Marbled murrelets (*Brachyramphus marmoratus*; federally listed threatened) are rare but have been observed in nearshore waters at Purisima Point and Point Sal (USSF 2021).

Western snowy plovers (*Charadrius nivosus nivosus*; federally listed threatened) occur on VSFB beaches and dunes year-round both as residents and migrants (USSF 2021). VSFB supported over 20 percent of the California population of Western snowy plovers in 2004 (USSF 2021). In the ROI, snowy plovers breed from March through September (USSF 2021) with peak nesting from mid-April to mid-June (USFWS 2007). During breeding season, 30 CES/CEI partially closes beaches on VSFB to minimize disturbances. VSFB is also an important wintering area for snowy plovers.

California least terns (*Sternula antillarum browni*; federally listed endangered) are found along the Pacific Coast of California where they nest in colonies from mid-April through August (USSF 2021). Since 1995, 30 CES/CEI has monitored a least tern colony at Purisima Point, which is over 7 miles from LF-23 and LF-24.

Southern sea otters (*Enhydra lutris nereis*; federally listed threatened) occur in nearshore marine habitats of the ROI where they feed primarily on abalones, sea urchins, crabs, and clams (USSF 2021). Sea otters spend a significant portion of their time at the water surface and are usually found rafting in kelp beds (USSF 2021). One primary rafting area for sea otter breeding colonies offshore of VSFB occurs near Purisima Point (**Figure 3.1-1**).



Data Source: World Imagery; World Street Map

Figure 3.1-2. Gaviota Tarplant Occurrence on North VSFB

3.1.2.4 Sensitive Habitats

Marine waters within 12 nm of the coast off VSFB are designated essential fish habitat for highly migratory species[6] and coastal pelagic species[7] under the Magnuson-Stevens Fishery Conservation and Management Act. There are no habitat areas of particular concern designated by the Pacific Fishery Management Council within the ROI. Designated critical habitat for black abalone (*Haliotis cracherodii*; federally listed endangered), leatherback sea turtle (*Dermochelys coriacea*; federally listed endangered), and humpback whale (*Megaptera novaeangliae*; federally listed threatened) is present in the marine waters within the ROI.

3.1.3 Coastal Zone Management

The California Coastal Act of 1976 (CCA), Section 30008, defines the authority of the California Coastal Management Plan (CCMP). The CCMP enforces the Coastal Zone Management Act (CZMA; 16 U.S. Code Section 1451 et seq.) and other federal laws that are related to planning or managing California coastal resources. The CCA defines the coastal zone as the water extending seaward to the outer limits of the state's jurisdiction; land extending inland approximately 1,000 yards from the mean high tide line; or land in significant coastal estuarine, habitat, and recreational areas, extending inland to the first major ridgeline paralleling the sea or 5 miles from the mean high tide line of the sea, whichever is less (CA Public Resources Code Division 20 - CCA, 1976, Section 30103). Federally controlled lands are not part of the coastal zone (15 CFR Part 923.33); however, under Coastal Zone Management Program regulations (15 CFR Part 923) and DAF implementing regulations (Air Force Manual 32-7003, Environmental Conservation), to the DAF must comply with the CCMP to the maximum extent practicable for any activity, regardless of location, that is likely to affect any land, water, or natural resource of a coastal zone in the reasonably foreseeable future.

Per the CZMA of 1972, federal activity in, or affecting, a coastal resource or use requires the federal entity to prepare either a negative determination (ND; no effect to a coastal resource or use) or a consistency determination (CD; effect to a coastal resource or use, but the activity is consistent to the maximum extent practicable). The DAF is responsible for making either an ND or a CD for its activities occurring within the state coastal zone or having effects on it. The California Coastal Commission (CCC) reviews federally authorized projects for consistency with the CZMA.

The project launch site (LF-23 and LF-24) is located within VSFB's boundary and owned by the DoD. Although the CZMA coastal zone definition excludes federal lands from the coastal zone, actions on DoD lands that may affect resources within the coastal zone must be reviewed for consistency with the CCMP. The proposed NGI flight test program may affect coastal use or resources within the coastal zone and therefore are subject to CCA provisions.

SLD 30 is committed to co-stewardship of coastal resources and has taken steps to protect and maintain coastal resources in collaboration with federal, state, and local agencies. This includes funding for research of marine mammals and minimizing the closure of public beaches. Point Sal State Beach is located adjacent to the northern extent of VSFB and consists of 80 acres with approximately 1.5 miles of

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[6] Highly migratory species are found throughout oceans and migrate across jurisdictional boundaries. West Coast highly migratory species include Pacific tunas, swordfish, sharks, and billfish.

[7] Coastal pelagic species live in the water column, as opposed to living near the sea floor, at depths from the surface to 1,000 meters deep, typically above the continental shelf. Coastal pelagic species on the West Coast include Pacific sardine (*Sardinops sagax caerulea*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), northern anchovy (*Engraulis mordax*), California market squid (*Doryteuthis opalescens*), and krill.

ocean frontage. Access to this area is limited to pedestrian access along the Brown Road Trail, which crosses through VSFB property. The Brown Road Trail is a strenuous 5-mile trail beginning on Brown Road and terminating at the beach. Public access is allowed from sunrise to sunset for recreational purposes only.

Since 1979, an evacuation and closure agreement for Point Sal State Beach has been in place between the DAF and Santa Barbara County. Under continuing agreements with the County and the State of California, upon the DAF's request, the County Parks Department and County Sheriff's Office can close the state beach to public access for a period of up to 48 hours. According to SLD 30 safety, Point Sal State Beach has closed, on average, fewer than five times per year over the last 10 years.

3.1.4 Cultural Resources

Cultural resources at VSFB have been documented in previous surveys and plans, most recently in the 2009 VAFB Integrated Cultural Resources Management Plan (ICRMP; Baloian 2009).

The ROI for cultural resources consists of the Area of Potential Effects (APE) identified for the Proposed Action. Under Section 106 of the National Historic Preservation Act (NHPA), federal agencies must take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Under this process, the federal agency evaluates the National Register of Historic Properties (NRHP) eligibility of resources within the proposed undertaking's APE, which is defined as the geographic area or areas within which an undertaking (project) may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.

The Proposed Action at VSFB requires no new ground-disturbing activities. Therefore, the APE for the Proposed Action is defined as the footprint of buildings and structures (silos) identified for modification, including the ground area surrounding the silos.

Historic-age cultural resources identified for modification in the Proposed Action at VSFB include two LFs (LF-23 and LF-24) and two buildings (Buildings 1555 and 1819):

- LF-23 and LF-24 were determined not eligible for listing in the NRHP in 2020 (Polanco 2020a).
- Building 1555 was recommended not eligible for listing in the NRHP in 2018 and determined not eligible for listing in 2020 as the ABRES Test Facility #2 (Mk 6 RV & Decoy Assembly Facility) as a component of a potential VAFB Nose Cone Training Facility District (Polanco 2020b, Smallwood 2018).
- Building 1819 was once considered a contributing element to the Rail Garrison Historic District; however, the Rail Garrison Historic District was reevaluated for NRHP eligibility in 2020 and determined not eligible for listing in the NRHP (Polanco 2020c).

No previously recorded archaeological sites are within or overlapping the APE at VSFB. The USSF may conduct government-to-government consultation with the Santa Ynez Band of Chumash Indians to identify resources of traditional, religious, and cultural importance within the APE at VSFB.

3.1.5 Hazardous Materials and Hazardous Waste Management

The ROI for hazardous materials and hazardous waste management at VSFB includes the entire installation.

The use of hazardous materials at VSFB is performed in compliance with all DoD regulations, including Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*. A list of all hazardous materials used is provided, along with the applicable safety data sheets, to the HazMART, which tracks hazardous material use across the installation.

Releases of hazardous substances and petroleum products from past activities at VSFB are identified and remediated through the Installation Restoration Program (IRP). Impacted sites are remediated and or managed with land use controls through the Federal Facilities Site Remediation Agreement, a working agreement among the USSF, the California Central Coast Regional Water Quality Control Board, and California Environmental Protection Agency's Department of Toxic Substances Control. These sites and activities are described in more detail in the Final GBSD Test EA/OEA (DAF 2021). Before new construction or demolition begins, the base dig permit process identifies IRP sites and potential hazardous materials so a determination can be made if the new activities or operations are consistent with the site closure requirements and/or land use controls (USSF 2021). Two facilities included in the Proposed Action, Building 8250 and Building 1604, are within or adjacent to IRP sites that have been closed without conditions or restrictions.

Some older buildings could contain hazardous materials used in their construction, such as asbestos-containing material (ACM), lead-based paint (DAF 2021). Occurrence of polychlorinated biphenyls (PCBs) on VSFB is limited to a small number of sealed transformers at the High Accuracy Instrumentation Radar (30 CES/CEIEC 2022). PCBs may also occur in older fluorescent light ballasts throughout the installation.

Hazardous waste management at VSFB is controlled and tracked by the Hazardous Waste Management Plan, Waste Analysis Plan, and various emergency response plans (30 CES/CEIEC 2022, USSF 2021). 30th Civil Engineer Squadron Installation Flight Management Environmental Compliance (30 CES/CEIEC) provides oversight for the implementation of these plans. These plans are applicable to all entities conducting activities on VSFB and its remote sites that generate hazardous and solid wastes. The Hazardous Waste Management Plan covers waste profiling and tracking, worker training, on-site waste generation and accumulation, handling and transportation, record keeping and, if required, the written approval from 30 CES/CEIEC for establishing either a Collection Accumulation Point or Satellite Accumulation Point.

Most support operations are positioned around the Main Cantonment area, which is close to the center of the northern half of the base (e.g., HazMART; the Collection and Accumulation Point and the Transportation, Storage, and Disposal Facility; the former base landfill and its associated groundwater reclamation system; and the SLC-2 Launch Water Reclamation System). Other pollution prevention operations, such as the Industrial Wastewater Treatment Plant, are on southern VSFB.

Based on the amount of hazardous waste generated annually, VSFB is designated a hazardous waste facility under the Resource Conservation and Recovery Act. The Department of Toxic Substances Control provides regulatory oversight of hazardous waste issues at VSFB. Hazardous waste operations at the base are authorized by Department of Toxic Substances Control under the Resource Conservation and Recovery Act Part B permit (HB&A 2020).

3.1.6 Health and Safety

The ROI for health and safety at VSFB includes the entire installation. The ROI also includes the ocean area off the coast of VSFB to the limit of the territorial seas (12 nm from the coast)[8] that would be included in the clearance areas for flight tests.

[8] The BOA begins at the limit of the territorial seas (see **Section 3.3**).

3.1.6.1 Installation

Health and safety consideration at VSFB have been thoroughly described in other documents and plans, most recently the Final GBSD Test EA/OEA (DAF 2021). Elements of health and safety that are relevant to the Proposed Action are summarized here.

All contractors performing construction and demolition activities at VSFB are responsible for following federal and State of California safety regulations and are required to conduct construction and demolition activities in a manner that does not increase risk to workers. Both DAF and applicable Occupational Safety and Health Administration (OSHA) regulations and standards are used to implement safety and health requirements for all workers on the installation, including military personnel (DAF 2021).

Health and safety requirements at VSFB include industrial hygiene, which is the joint responsibility of Bioenvironmental Services and the SLD 30 Safety Office. Establishing and managing the overall safety program is the responsibility of the SLD 30 Safety Office (DAF 2021).

VSFB has its own emergency services that include the fire department, disaster control group, and security police force, in addition to contract support for the handling of accidental releases of propellants and other hazardous substances. Fire department elements are pre-positioned during launch operations to expedite response in the event of a launch anomaly. Fire breaks are established or maintained on a regular basis at launch facilities (DAF 2021).

The primary military medical facilities at VSFB are the 30th Medical Group's Family Health Clinic, Pediatric Clinic, and Space Missile Medicine Clinic. Several other clinics and hospitals are off-installation in the cities of Lompoc and Santa Maria (DAF 2021).

3.1.6.2 Launches

VSFB has protocols in place to protect health and safety during launches, including in the unlikely event of a test mishap. Pre-flight activities, including communication safety procedures, are described in detail in **Section 2.1.3.4.1**. Prior to conducting missile and other rocket launches, launch operations are evaluated by the SLD 30 Safety Office to ensure populated areas, critical range assets, and civilian property susceptible to damage are outside predicted impact/debris limits near the launch site and along the flight corridor. Flight safety plans prepared for each mission include the evaluation of risks to inhabitants and property near the flight path, calculated trajectory and debris areas, and specific range clearance and notification procedures.

Once they are defined, the Range Safety Officer communicates the extent of the clearance area(s), time, and date of the flight test to the FAA, the USCG, and appropriate emergency management agencies for assistance in the clearance of designated areas prior to launch. NOTMARs are issued 10 days prior to a planned launch. The USCG transmits marine radio broadcast warnings that define the public ship avoidance area(s) for the launch event and inform vessels of the effective closure time of the area(s). The avoidance area would be lifted as soon as the USCG determines that it is safe to do so. The FAA issues NOTAMs to warn aircraft to avoid clearance areas and other existing Warning Areas. Resources such as radar, ground-roving security forces, and/or helicopter support are used prior to operations to ensure evacuation of non-critical personnel. Nearby access roads may be closed, and access to Point Sal State Beach may be restricted (see **Section 3.1.3**). The DAF also coordinates and monitors train traffic passing through the base during hazardous operations.

Atmospheric dispersal modeling is also conducted prior to each launch to ensure that rocket emission concentrations do not exceed certain levels outside controlled areas. If meteorological conditions are unfavorable, the launch is postponed until conditions improve.

3.1.7 Noise

Noise at VSFB has been thoroughly documented in previous documents and plans, most recently in the VSFB INRMP (USSF 2021) and the VAFB Installation Development Plan (HB&A 2020), which were used along with the documents listed in **Section 1.8** to describe existing conditions.

Ambient noise at VSFB is generally low because most of the installation is undeveloped open space, with industrial, community, and airfield areas concentrated in the central portion of the installation (HB&A 2020). Operational noise is concentrated in the industrial areas and along transportation routes, and is related to automobile and truck traffic, fixed-wing and rotary-wing aircraft operations (variable and up to 6,050 per year) at the centrally located airfield, and infrequent missile and space launch operations. Launch areas are primarily concentrated in the western portion of the installation along the coast; two launch areas are located along the airfield. Most mission-related noise affects only the area within the installation boundaries, with the highest noise contour areas concentrated at the airfield or launch areas during flight or launch activities.

Areas surrounding VSFB are largely composed of undeveloped and rural land, with some unincorporated residential areas in the Lompoc and Santa Maria valleys, and Northern Santa Barbara County where low-level (45 decibels [dB]) ambient noise is typical. In these areas, generated noise is related to traffic along roadways, local industrial and airport areas, and intermittent aircraft overflights (DAF 2004, DAF 2021, USSF 2021). A small agricultural area on off-base property at the southwestern end of the runway is impacted by the installation's 60 dB noise zone (HB&A 2020).

A total of 48 missile launches were conducted between 2012 and 2018, for an average of 8 launches per year (HB&A 2020). The western range can reasonably support up to 15 missile launches annually. Depending on the launch vehicle, missile launches at VSFB can generate noise levels of 125 decibels (dB) or higher in the immediate vicinity of the launch (DAF 2021). Noise levels farther from launch sites depend on the size and explosive weight of the vehicle, launch location and trajectory, weather conditions, and intervening terrain. Following launches from north VSFB, unweighted noise levels in the communities of Lompoc, Santa Maria, and Guadalupe can reach 100 dB, 95 dB, and 105 dB, respectively, over an effective duration of about 20 seconds per launch (DAF 2004, DAF 2021). Equivalent A-weighted sound levels in these areas would be lower. Because launches from VSFB occur infrequently, and the launch noise generated from each event is of very short duration, the average noise levels in the nearby areas are generally unaffected.

All launch vehicles that exceed the speed of sound also generate a sonic boom, which is a sound that resembles rolling thunder. Missile launches typically produce a sonic boom during the vehicle's ascent that lasts less than 1 second. Some components of the missile may also generate a second sonic boom upon re-entry into the atmosphere. SLD 30 has prepared sonic boom modeling for the range of vehicles launched from VSFB. This modeling has shown that the westward trajectories of all missile launches from north VSFB, including from LF-23 and LF-24, do not cause sonic boom impacts on the California mainland or the North Channel Islands (USSF 2023).

3.1.8 Socioeconomics and Environmental Justice

The ROI for socioeconomics and EJ for VSFB is defined as the communities and areas surrounding the installation, which include Santa Barbara County, California, and the communities of Santa Maria, Lompoc, and VSFB itself, which is considered a Census Designated Place (CDP). VSFB is in the western part of unincorporated Santa Barbara County. The city of Lompoc lies 3 miles to the east, and the city of Santa Maria is 6 miles to the northeast of VSFB. Both cities are in Santa Barbara County.

3.1.8.1 Population, Employment, and Income

The total population of California, including Santa Barbara County and the target communities within the ROI, increased between 2010 and 2022 (**Table 3.1-7**). However, these populations decreased between 2020 and 2022 as a result of COVID-19 deaths, outmigration to other states, sharp declines in international immigration, and declining birth rates (Johnson et al. 2023).

Based on 2022 estimates, the total population of Santa Barbara County is 443,837 persons (U.S. Census Bureau 2023a). Of that total, 13.4 percent (approximately 59,470 persons) are low income, 31.4 percent (approximately 139,360 persons) are minority (non-White), and 46.4 percent (approximately 205,940 persons) are of Hispanic origin. The populations of Santa Maria and Lompoc are younger and more Hispanic than the county and state totals. Lompoc has a lower rate of employment and a higher rate of people living below the poverty line. The population of VSFB CDP consists entirely of military personnel and their families and has a higher rate of employment and a lower rate of people living below the poverty line compared to state and county levels. **Table 3.1-7** shows the population, race and ethnicity, and income data for California and the target communities.

Major employers in the ROI include the University of California Santa Barbara, VSFB, and the County of Santa Barbara (Santa Barbara South Coast Chamber of Commerce 2023). The University of California, Santa Barbara, had an enrollment of 26,421 in 2022–2023 and is the area's largest employer with over 12,000 employees (University of California Santa Barbara 2023). VSFB employs 2,892 military personnel, 1,143 civilian workers, and 2,822 contractors (6,857 total employees; HB&A 2020).

3.1.8.2 Public Services

Public services include fire, police, medical, and emergency services. Incorporated municipalities with their own municipal police departments include Santa Maria, Lompoc, and Santa Barbara City. On base, the 30th Medical Group provides health care services, and the VSFB fire department provides 24-hour fire and emergency services. The 30 Force Support Squadron at VSFB offers an assortment of services for military personnel, their families, and other eligible personnel.

3.1.8.3 Identification of EJ Communities

EJ communities are those that have a higher percentage of low-income and/or minority communities than the comparison populations. Within the ROI, VSFB CDP, Santa Maria, and Lompoc are EJ communities based on minority population, as they have larger minority populations than Santa Barbara County and the state of California. Lompoc is also an EJ community based on poverty levels (compared to Santa Barbara County).

Table 3.1-7. Population and Income, VSFB ROI

Variable	California	Santa Barbara County	Santa Maria	Lompoc	VSFB CDP [a]
Population					
Population, Estimate, 2022 [b]	**39,029,342**	**443,837**	**110,125**	**43,738**	**3,638** [c]
Population, Census, 2020 [d]	39,538,223	448,229	109,707	44,444	3,559
Population, Census, 2010 [e]	37,253,956	423,895	99,553	42,434	3,338
Percent Change – 2020 to 2022	-1.3%	-1.0%	0.4%	-1.6%	2.2% [f]
Percent Change – 2010 to 2022	4.8%	4.7%	10.6%	3.1%	9.0% [f]
Age [d]					
Persons under 5 years old	5.4%	5.5%	7.8%	6.4%	13.7%
Persons under 18 years old	22.0%	21.7%	30.2%	24.7%	34.2%
Race and Hispanic Origin [c]					
White	52.1%	65.9%	59.4%	55.9%	63.7%
Black or African American	5.7%	1.9%	1.2%	2.8%	15.0%
American Indian and Alaska Native	0.9%	1.2%	1.7%	1.8%	0.5%
Asian	14.9%	5.5%	4.7%	4.1%	4.3%
Native Hawaiian and Other Pacific Islander	0.4%	0.1%	0.0%	0.3%	0.7%
Some Other Race	15.3%	11.3%	11.3%	18.1%	3.1%
Two or More Races	10.7%	14.1%	21.7%	17.0%	12.7%
Hispanic or Latino [g]	39.5%	46.4%	77.4%	61.4%	15.5%
White alone, not Hispanic or Latino [g]	35.8%	43.0%	15.1%	28.6%	54.6%

Variable	California	Santa Barbara County	Santa Maria	Lompoc	VSFB CDP [a]
Employment and Income [h]					
In labor force, percent of population age 16 years and over, 2017–2021	63.9%	63.3%	66.5%	59.3%	79.6%
Median household income (in 2021 dollars), 2017–2021	$84,097	$84,356	$73,300	$60,234	$64,576
Per capita income in past 12 months (in 2021 dollars), 2017–2021	$41,276	$40,634	$23,537	$24,419	$25,625
Persons in poverty	12.3%	13.4%	12.8%	19.4%	1.6%

(a) The place name for VSFB is recorded as Vandenberg AFB CDP in U.S. Census Bureau datasets.

(b) Source: American Community Survey 2022 1-Year Supplemental Estimate (U.S. Census Bureau 2023a).

(c) Source: American Community Survey 2021 5-Year Estimates (U.S. Census Bureau 2023d).

(d) Source: 2020 Decennial Census (U.S. Census Bureau 2023b).

(e) Source: 2010 Decennial Census (U.S. Census Bureau 2023c).

(f) Percent change to 2021 as 2022 data is not available.

(g) The U.S. Census tracks race and Hispanic origin (also known as ethnicity) as two separate and distinct concepts. Someone of Hispanic origin may be of any race.

(h) Source: American Community Survey 2021 5-Year Estimates (U.S. Census Bureau 2023e).

3.1.9 Water Resources

Water resources at VSFB have been thoroughly documented in previous documents and plans, most recently in the 2021 VSFB INRMP (USSF 2021) and the Final GBSD Test EA/OEA (DAF 2021).

The ROI for water resources is the northern half of VSFB, which is within the San Antonio Creek and Shuman Creek drainages. The San Antonio Creek watershed has a drainage area of 154 square miles. The upper reaches of San Antonio Creek have intermittent flows, generally as runoff from winter rains. The lower reaches (downstream of Barka Slough) are perennial and fed by surfacing groundwater. The creek discharges in into a small lagoon which breaks through the sand dunes during large storms, leading to tidal inundation (USSF 2021).

Shuman Creek is located approximately 3 miles south of the northern VSFB boundary. It is 9 miles long and has a drainage area of 21 square miles. It is a narrow, shallow stream that discharges directly to the Pacific Ocean, with higher flows during the wet winter months (USSF 2021). During the summer, most flow infiltrates or is impounded by dunes and dense vegetation approximately 990 feet east of the ocean (DAF 1999).

EO 11988 – *Floodplain Management* requires federal agencies to reduce the risk of flood loss, minimize the impact of flood on human safety, and restore and preserve the natural beneficial values served by floodplains; and to evaluate alternatives prior to proceeding with federal actions that may affect floodplains. The Federal Emergency Management Agency (FEMA) has not produced flood hazard mapping for VSFB. In December 2022, Colorado State University (CSU) generated comprehensive flood maps for VSFB using high-resolution elevation, precise land cover data (0.3 meter), and sophisticated 2D hydraulic modeling (CSU 2022). FEMA reviewed the CSU-generated flood maps and endorsed the models and methodology used. The facilities proposed for use at VSFB are not located within the 100-year or 500-year floodplain.

Vernal pools and seasonal wetlands occur at VSFB. Vernal pools are depressions which contain water for only a portion of the year and are ecologically important and sensitive habitats (California Department of Fish and Wildlife 2022). A 2018 survey identified 1,424 acres of potential vernal pools on VSFB, the majority of which occur on the Burton Mesa in the Main Cantonment area (USSF 2021).

VSFB is in Santa Barbara County, where groundwater supplies about 77 percent of domestic, commercial, industrial, and agricultural water (USSF 2021). The Coastal Branch of the Central Coast Water Authority supplies water to VSFB. Due to the unpredictability of the water available from Central Coast Water Authority, the base must tap groundwater wells to compensate when demand exceeds the Central Coast Water Authority allotment (HB&A 2020). Aquifer levels in VSFB are declining (USSF 2021).

Water Resources at VSFB are protected through compliance with the Clean Water Act, Safe Drinking Water Act, the California Porter-Cologne Water Quality Act (California Water Code), California Health and Safety Code, state water quality regulations, VSFB permits, and related plan requirements. Permits include the California drinking water permit, the City of Lompoc domestic wastewater permit, the California National Pollutant Discharge Elimination System (NPDES) Small Municipal Separate Sewer System (MS4) General Permit, and the California NPDES Industrial General Permit. Coverage under a NPDES Construction General Permit and an associated Stormwater Pollution Prevention Plan (SWPPP) may be required for construction activities that disturb 1 acre or more of soil.

3.2 Fort Greely, Alaska

At FGA, air quality and climate variability, cultural resources, hazardous materials and hazardous waste management, health and safety, noise, socioeconomics and EJ, and water resources are the environmental resource areas of concern requiring discussion. Airspace management, biological resources, land use, coastal zone management, infrastructure (utilities), transportation, and visual resources were not analyzed further because negligible impacts to these resources would be anticipated as a result of implementing the Proposed Action at FGA.

The Proposed Action is well within the limits of current operations and permits of the installation, and thus there would be no effects on land use. FGA is in Interior Alaska and is not near the coastal zone.

Construction of new buildings and facilities, and possible modifications to Building 663, at FGA would result in negligible change to utilities at FGA. Minimal increases in water and electricity usage and wastewater production are expected. All new facilities at FGA would comply with the applicable regulatory requirements and standards for energy efficiency and sustainability. All site preparations, including facility modifications and new construction, would occur in the existing MDC or cantonment area and would not alter the current landscape; therefore, no impacts to geology and soils, biological resources, or visual resources would be expected. No flight testing is proposed at FGA and thus biological resources would not be impacted by these activities.

Short-term, negligible, adverse impacts on transportation and traffic would be anticipated during the site preparation phase at FGA due to the presence of construction and support personnel. It is anticipated that transportation of the NGI components or preassembled AURs to FGA would occur via military aircraft. The MDA expects that the missile transporter would also be transported via military aircraft but unloaded transporter(s) could be driven to FGA via the Interstate Highway System and the Canadian highway system. All required permits to drive the oversize and overweight transporter would be obtained, including permits from Transport Canada. Traffic in the immediate wake of the transporter may be temporarily slowed. These impacts would be localized, short-term, and negligible.

All new NGI facilities would be constructed in accordance with FAA regulations in 14 CFR Part 77, *Safe, Efficient Use, and Preservation of Navigable Airspace*, so as not to create any obstructions to air navigation, or adversely affect navigational and communication facilities and equipment.

3.2.1 Air Quality and Climate Variability

Air quality at FGA has been thoroughly documented in previous sources, most recently in the GMD Expanded Capability EA (MDA 2018).

The ROI for air quality consists of the entire air basin surrounding FGA, which includes Fairbanks North Star Borough, Southeast Fairbanks Census Area, Valdez-Cordova Census Area, and the eastern part of Yukon-Koyukuk Census Area. FGA is within the Northern Alaska AQCR (AQCR 9; 40 CFR Part 81.246). Air quality in Interior Alaska is generally very good but is occasionally impacted by smoke from wildfires throughout the region. The area in which FGA is located is in attainment for all national and statewide standards. **Table 3.2-1** shows Southeast Fairbanks Census Area emissions for 2020 (the most recent year of available data).

Table 3.2-1. 2020 Emissions – Southeast Fairbanks Census Area, Alaska (Tons)

Source	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOC	NH_3	CO_2e	HAP
Area [a]	2,792	21	16	1,290	331	654	45	1,791	101
Stationary	4,734	257	25	883	879	249	6	-	38
Mobile, On-Road	1,146	136	<1	7	5	56	4	167	15
Mobile, Non-Road	437	10	<1	2	2	73	<1	74	23
Total	9,109	424	41	2,183	1,217	1,032	56	2,032	176

Source: USEPA 2020b
Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent (includes CO_2 and methane); HAP = hazardous air pollutant; NH_3 = ammonia; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound.
"-" indicates that no emissions estimate is determined, or not applicable.
(a) Area-wide sources include fires (wildfires), agriculture, and dust.

The FGA main installation and the MDA MDC each has separate Title V Air Permits issued by the Alaska Department of Environmental Conservation (ADEC). FGA is not classified by the USEPA as a PSD major source. To maintain this status, the current air permits require both FGA (i.e., cantonment and airfield areas) and the MDC to limit emissions to 250 tpy for each criteria pollutant. Existing air emissions sources at FGA include boilers, generators, storage tanks, aircraft, and prescribed burning/firefighter training (MDA 2018). In addition, un-vegetated areas, dirt roads, and exposed river and stream beds result in fugitive dust during high wind periods. Emissions sources from the MDC include boilers and generators. **Table 3.2-2** shows the 2022 emissions estimates (the most recent year of data available) from stationary sources at the MDC.

Table 3.2-2. 2022 Annual Emissions Estimates from the MDC at FGA

Source	Emissions (Tons)				
	NO_x	SO_2	CO	PM_{10}	VOC
Generators	23.92	0.01	2.14	0.34	0.77
Boilers	2.79	0.03	0.70	0.33	0.05
Total [a]	26.72	0.05	2.84	0.67	0.83

Source: Emissions estimate data based on MDA MDC 2022 Semi-annual Operating Reports
Notes: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound.
(a) Totals may not add up due to rounding.

The social cost of the GHG emissions from the MDC at FGA has been prepared (**Table 3.2-3**). The values presented in **Table 3.2-3** were calculated based on estimated annual diesel fuel usage by the generators at the MDC of 441,089 gallons (from MDA MDC 2022 Semi-annual Operating Reports). Individual estimates of annual emissions of carbon dioxide, methane, and nitrous dioxide in metric tons per year were then calculated using emissions factors in the USEPA GHG Emissions Hub (USEPA 2023), and the social costs of these emissions were calculated in 2020 dollars as described in **Section 3.1.1.2**. Based on these calculations, the social cost of GHG emissions from the MDC in 2023 is between approximately $142,000 and $674,000. This estimate does not account for potential GHG emissions from mobile sources.

Table 3.2-3. Social Costs of GHG Emissions from the MDC at FGA in 2023

Greenhouse Gas	Estimated Total Annual Emissions (metric tons) [a]	2023 Social Cost Rates (in 2020 dollars per metric ton of gas) [b]		Estimated 2023 GHG Social Costs (in 2020 dollars)	
		5% Discount Rate	2.5% Discount Rate	5% Discount Rate	2.5% Discount Rate
Carbon Dioxide (CO_2)	4,502.5	$15.94	$80.34	$71,779.27	$361,728.42
Methane (CH_4)	4.5	$747.38	$2,119.53	$3,378.26	$9,580.63
Nitrous Oxide (N_2O)	10.5	$6,385.35	$28,800.99	$67,130.71	$302,791.77
Total	-	-	-	$142,288.24	$674,100.82

Notes: GHG = greenhouse gas. "-" indicates that no estimate is determined, or not applicable.

(a) Calculated using the default emissions factors for distillate fuel oil no. 2 (for stationary sources; USEPA 2023).

(b) Annual unrounded estimates for the social cost of carbon, methane, and nitrous oxide (OMB 2021).

3.2.2 Cultural Resources

Cultural resources at FGA have been documented in previous documents and plans, most recently in the 2020 USAG Alaska ICRMP (USAG Alaska 2020a).

The APE at FGA is defined as the footprint of buildings and structures identified for modification, including the ground area surrounding the silos (see **Table 2.1-4**). The APE also includes areas identified for new construction.

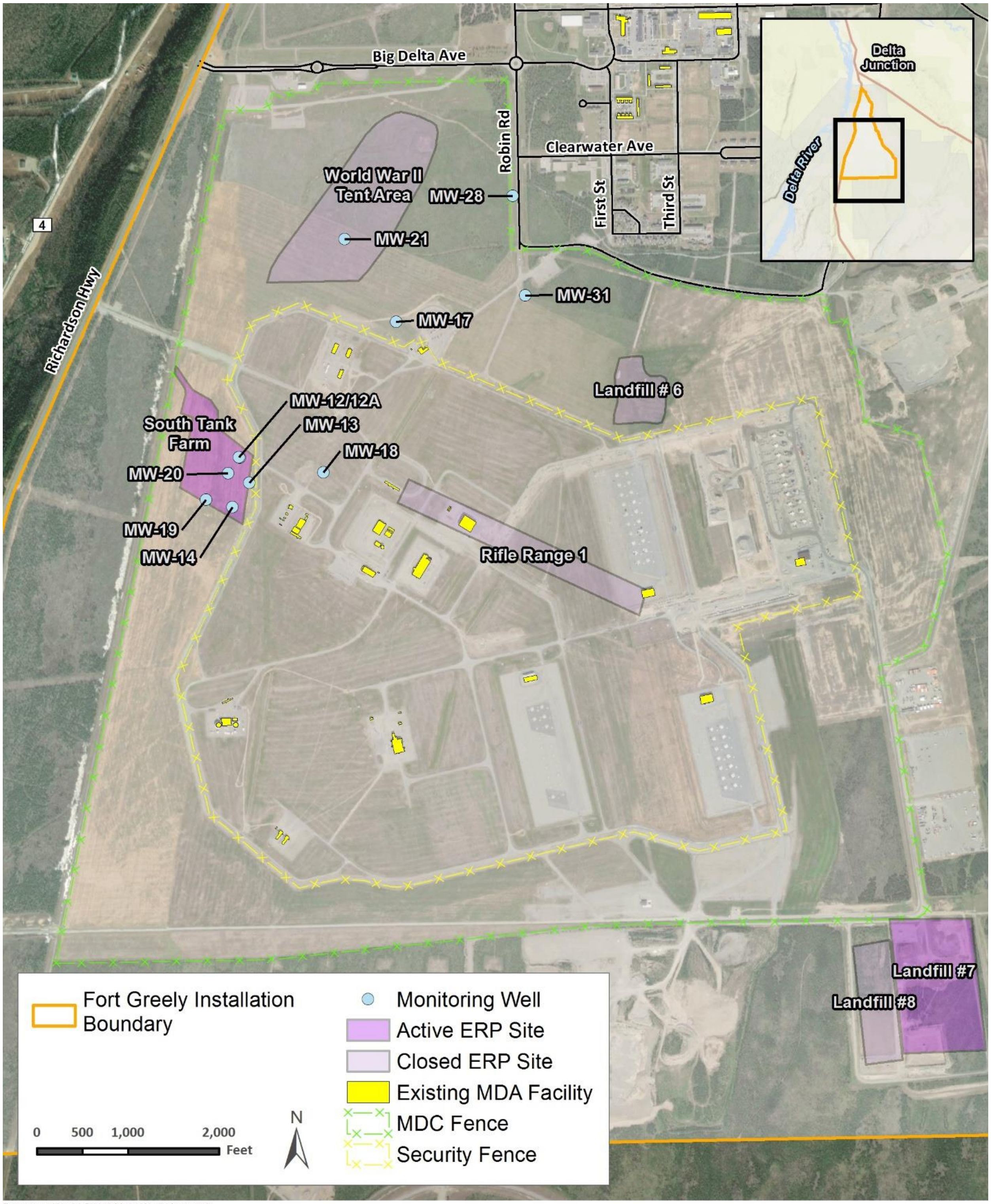
There are no Historic-age cultural resources identified for use in the APE at FGA. All buildings over 40 years old on FGA have been surveyed. Building survey work began in 1997, and at that time, 26 Cold War-era buildings on FGA were determined to be eligible for the NRHP, and the Fort Greely Cold War Historic District was created. In response to the realignment of FGA, the installation and the Alaska State Historic Preservation Office (SHPO) entered into a Memorandum of Agreement (MOA) in 1999 concerning these buildings. Under the MOA, the Army agreed to mitigate any impacts to the structures within the historic district by preparing a Historic American Buildings Survey. Upon completion of the survey, the MOA allowed the Army to transfer, remodel, rehabilitate, or demolish any of these buildings without SHPO consultation. In 2021, the Alaska SHPO concurred that the historic district would no longer be eligible for the NRHP following the demolition of Buildings 606 and 607, as these were the last mission-related contributing properties in the district.

The MDC area, which overlaps the APE, was previously surveyed for archaeological resources; no cultural resources were encountered in the area and the likelihood of encountering archaeological resources in the area is considered very low (USAG Fort Greely 2005, USASMDC 2002b, USASMDC 2002c). Building 663, which is in the cantonment area and may require modification, is not Historic. MDA, in cooperation with the DA, will consult with Alaska Native tribes and villages within the vicinity of FGA in regard to the Proposed Action.

3.2.3 Hazardous Materials and Hazardous Waste Management

The ROI for hazardous materials and hazardous waste management at FGA includes the MDC and area surrounding Building 663.

Environmental cleanup at FGA has been addressed under both the IRP and the Base Realignment and Closure Environmental Cleanup Program. Numerous sites have been investigated by the U.S. Army and remediated under these programs (MDA 2018). The ADEC Contaminated Sites database lists 39 active sites on the installation (ADEC 2023). IRP sites near the MDC are shown in **Figure 3.2-1** and include the South Tank Farm, Landfill No. 6, and WWII Tent area. These sites are described in the GMD Expanded Capability EA (MDA 2018).



Basemap: World Street Map; World Imagery

Figure 3.2-1. FGA IRP Sites Within the MDC

The FGA Hazardous Materials and Waste Management Procedure contains SOPs for the correct management and storage of hazardous materials on the installation and complies with all applicable state and Federal regulations (MDA 2018). The procedure includes site-specific good housekeeping practices, facility surveys, satellite accumulation area inspections, employee training, record keeping, internal reporting, comprehensive site compliance evaluation, and sediment and erosion control. The installation also complies with applicable reporting requirements by submitting annual emergency response and extremely hazardous substances updates to the local emergency management officials.

FGA is registered by the USEPA as a small quantity generator of hazardous waste (MDA 2018). The MDA is not required to register for a separate USEPA Identification number to generate hazardous waste at FGA. The wastes are accumulated at satellite accumulation points throughout the installation before disposal. Building 637 serves as the temporary hazardous waste storage facility prior to shipment off base. Hazardous waste management is performed in accordance with the FGA Hazardous Materials and Waste Management Procedures.

3.2.4 Health and Safety

The ROI for health and safety at FGA includes the entire installation.

Health and safety concerns at FGA are associated with operation of an airfield, military training activities in adjacent lands, the operational missile defense system, and the prevention and control of forest fires. The fire station is located in the cantonment area of the base and is staffed to support the current MDA mission. To assist in emergency response, FGA maintains mutual aid agreements with the city of Delta Junction, the Interior Medical Facilities, and the State of Alaska Division of Forestry (MDA 2018).

The MDC at FGA is an operational missile defense system with established safety plans and procedures for routine operations and for emergency situations (MDA 2018). Hazards associated with construction and operation of the system, including transportation and handling of interceptors, were fully analyzed in the NMD Deployment EIS (USASMDC 2000), GMD Validation of Operational Concept EA (USASMDC 2002b), and GMD Expanded Capability EA (MDA 2018).

The current missile fields and associated support facilities at FGA were constructed in compliance with established worker health and safety standards and ESQD zones, which fall within the MDC boundary.

3.2.5 Noise

Noise at FGA has been thoroughly documented in previous documents and plans, most recently in the USAG Alaska INRMP (USAG Alaska 2020b) and the GMD Expanded Capability EA (MDA 2018), which were used along with the documents listed in **Section 1.8** to describe existing conditions.

The primary noise sources at FGA include nearby highway traffic and on-base roadway traffic, helicopter flight operations, firing of large and small caliber weapons, and operation of maintenance equipment. The frequency and duration of noise from these activities varies as a factor of the irregular training schedules. Noise levels generated by firing weapons typically ranges between 112 and 190 dBA. Noise at ground level from helicopter flight at an altitude of 1,500 feet overhead would be approximately 79 dBA; at an altitude of 250 feet above ground level, the noise would be around 95 dBA. Maintenance equipment, such as the tracked vehicles used for trail maintenance, can generate noise levels up to 105 dBA.

Off-installation areas surrounding FGA are sparsely developed and typically have an ambient noise level at or below 55 dBA. No noise sensitive receptors are known to exist in the vicinity of FGA.

3.2.6 Socioeconomics and Environmental Justice

The ROI for socioeconomics and EJ for FGA is defined as the communities and areas surrounding the installation, including the Southeast Fairbanks Census Area and the communities of Delta Junction, Big Delta, and Fort Greely CDP. FGA is within the Southeast Fairbanks Census Area in Interior Alaska. Delta Junction and Big Delta are located along the Richardson Highway 5 and 13 miles, respectively, north of FGA.

3.2.6.1 Population, Employment, and Income

The population of the Southeast Fairbanks Census Area decreased 0.1 percent between 2010 and 2022, in contrast to the overall population of Alaska, which increased 3.3 percent (Table 3.2-4). This population decline is likely due to outmigration from smaller communities within the region, as the population of Big Delta decreased between 2010 and 2022 while the population of Delta Junction increased.

Based on 2022 estimates, the total population of Southeast Fairbanks Census Area is 7,021 persons (U.S. Census Bureau 2023f). Of that total,11.4 percent (approximately 800 persons) are low income and 25.3 percent (approximately 1,780 persons) are minority (non-White). The White populations of Delta Junction and Big Delta are higher in number than the White populations of the census area and state. The Southeast Fairbanks Census Area has a lower employment rate, lower per capita income, and higher percentage of people living in poverty compared to Alaska; this is due to the fact that the region has a mixed subsistence-cash economy, and many people divide their time between subsistence activities and cash-based employment (Tanana Chiefs Conference 2022).The population of Fort Greely CDP consists entirely of military personnel and their families and has a higher rate of employment and a lower rate of people living below the poverty line compared to state and county levels. **Table 3.2-4** shows the population and income data for Alaska and the target communities.

Primary industries in Interior Alaska include natural resource extraction (mining, and oil and gas), agriculture, tourism, and manufacturing (Applied Development Economics 2016). Major employers in the FGA area are FGA, the Delta/Greely School District, Alyeska Pipeline Services, and state and federal highway maintenance services (USASMDC 2003). FGA currently employs 236 military personnel, 226 civilian workers, and 573 contractors (1,035 total employees; Military Installations 2023).

3.2.6.2 Public Service

The Alaska State Troopers, which provides law enforcement in all communities in Alaska, has a post in Delta Junction. Delta Junction, Big Delta, and the surrounding areas are served by two volunteer fire departments, which share mutual aid agreements with FGA and the Alaska Department of Natural Resources, Division of Forestry (City of Delta Junction 2023). Several medical clinics are located in the area, including on FGA, and the nearest hospital is Fairbanks Memorial in Fairbanks.

3.2.6.3 Identification of EJ Communities

There are no EJ communities identified within the FGA ROI.

Table 3.2-4. Population and Income, FGA ROI

Variable	Alaska	Southeast Fairbanks Census Area	Delta Junction	Big Delta	Fort Greely CDP
Population					
Population, Estimate, 2022 [a] / 2021 [b]	733,583 [a]	7,021 [a]	1,259 [b]	521[b]	150 [b]
Population, Census, 2020 [c]	733,391	6,808	918	444	309
Population, Census, 2010 [d]	710,231	7,029	958	591	539
Percent Change – 2020 to 2022/2021	<0.1%	3.1%	37.2%	17.3%	-51.5%
Percent Change – 2010 to 2022/2021	3.3%	-0.1%	31.4%	-11.8%	-72.2%
Age [c]					
Persons under 5 years old	6.6%	5.6%	6.2%	5.6%	9.7%
Persons under 18 years old	24.5%	23.3%	24.8%	21.2%	33.0%
Race and Hispanic Origin [e]					
White	59.4%	74.7%	86.1%	89.0%	66.0%
Black or African American	3.0%	1.1%	0.8%	1.4%	1.6%
American Indian and Alaska Native	15.2%	12.0%	1.3%	2.7%	1.6%
Asian	6.0%	1.3%	0.4%	0.9%	2.9%
Native Hawaiian and Other Pacific Islander	1.7%	0.2%	1.3%	0.0%	0.3%
Some Other Race	2.5%	2.0%	1.7%	1.1%	5.8%
Two or More Races	12.2%	8.7%	8.4%	5.0%	21.7%
Hispanic or Latino [f]	6.8%	5.5%	7.0%%	3.2%	25.6%
White alone, not Hispanic or Latino [f]	57.5%	73.3%	84.1%	87.4%	62.8%

Variable	Alaska	Southeast Fairbanks Census Area	Delta Junction	Big Delta	Fort Greely CDP
Employment and Income [g]					
In labor force, percent of population age 16 years and over, 2017–2021	67.1%	58.4%	60.5%	62.9%	75.0%
Median household income (in 2021 dollars), 2017–2021	$80,287	$68,634	$71,765	$75,556	$60,625
Per capita income in past 12 months (in 2021 dollars), 2017–2021	$39,236	$31,546	$34,093	$24,071	$31,074
Persons in poverty	10.4%	11.4%	11.6%	6.3%	0.0%

(a) Source: 2022 Population Estimates Program (U.S. Census Bureau 2023f).

(b) Source: American Community Survey 2021 5-Year Estimates (U.S. Census Bureau 2023g).

(c) Source: 2020 Decennial Census (U.S. Census Bureau 2023h).

(d) Source: 2010 Decennial Census (U.S. Census Bureau 2023i).

(e) Source: 2020 Decennial Census (U.S. Census Bureau 2023j).

(f) The U.S. Census tracks race and Hispanic origin (also known as ethnicity) as two separate and distinct concepts. Someone of Hispanic origin may be of any race.

(g) Source: American Community Survey 2021 5-Year Estimates (U.S. Census Bureau 2023k).

3.2.7 Water Resources

Water resources at FGA have been thoroughly documented in previous documents and plans, most recently in the USAG Alaska INRMP (USAG Alaska 2020b) and the GMD Expanded Capability EA (MDA 2018).

The ROI for water resources at FGA is the MDC, within the southern half of the installation. Modifications to Building 663 on the cantonment area would not affect water resources and thus it is not included in the ROI. FGA is in the Delta River watershed. The ROI is located between the Delta River to the west and Jarvis Creek to the east. Both are glacier-fed and silt-laden. The peak flow in these water systems is reached in late summer when snow and ice melt is augmented by rainfall. Minimum flow occurs in winter when precipitation occurs as snow and Jarvis Creek and Delta River are generally frozen solid (USAG Fort Greely 2005). The only major surface water on FGA is Canister Lake, located southeast of the MDC. Other surface water bodies are intermittent, unnamed creeks and lakes.

Although floodplain boundaries have not been developed for FGA, there is a low probability of flooding (USAG Fort Greely 2005). It is known that the east bank of the Delta River is much higher than the west bank, and high flows in the Delta River overflow to the west rather than toward the ROI (USAG Alaska 2020b, USAG Fort Greely 2005). Since a barrier was placed at a relic channel of Jarvis Creek in the mid-20th century, flooding along the channel has not occurred (USAG Fort Greely 2005).

The Salcha Delta Soil and Water Conservation District completed a delineation of wetlands and other waters of the U.S. on FGA in 2016. This delineation showed that the 1999 Donnelly Flats fire, which burned 67 percent of FGA, significantly altered the hydrology and the distribution of wetlands in the area. There are no wetlands within the ROI (MDA 2018).

Four water supply wells are located on the MDC, which are used to support operations. No new water wells are anticipated with the Proposed Action.

3.3 Broad Ocean Area

Within the BOA, only biological resources require detailed analysis. Resources considered but excluded from further analysis are discussed in **Section 3.3.2**.

3.3.1 Biological Resources

In this EA/OEA, the BOA in consideration is the ocean area along the interceptor and target missiles' flight paths that is outside of territorial seas (generally up to 12 nm from a nation's coastline). For biological resources, the BOA ROI includes areas subject to the effects of the Proposed Action including the over-ocean flight corridor, expended booster drop zones, debris impact areas, terminal hazard areas, and the flight termination boundary (see **Figure 2.1-4**). This would be within the swath of open ocean between the Marshall Islands and southern California.

Biological resources in the BOA ROI were recently described in the Minuteman III Modification and Fuze Modernization Supplemental EA (USASMDC and Teledyne Brown Engineering, Inc., 2019) and the Final GBSD Test EA/OEA (DAF 2021). The BOA ROI consists of deep Pacific Ocean waters between California and Kwajalein Atoll and includes both pelagic (open waters) and benthic (sea floor) habitats. Given the large extent of the Pacific covered by the BOA ROI, a large number of special status marine mammals, sea turtles, fish, and seabirds have the potential to occur within this area. These species are listed in **Appendix B**, and the status, life histories, distribution, and abundance of these special status species can be found in the Biological Assessment for the Minuteman III Modification (USAFGSC and USASMDC/ARSTRAT 2015 as cited in USASMDC and Teledyne Brown Engineering, Inc. 2019) and the

Biological Assessment Addendum for Minuteman III Modification (USAFGSC and USASMDC/ARSTRAT 2018 as cited in USASMDC and Teledyne Brown Engineering, Inc. 2019).

The United States designates critical habitat, essential fish habitat, and marine protected areas within the U.S. exclusive economic zone, which extends from the outer limit of the territorial sea (12 nm from the coastline) out to 200 nm. Within the BOA ROI, critical habitat for leatherback sea turtle and humpback whale and essential fish habitat and habitat areas of particular concern for Pacific coast groundfish, coastal pelagic species, and highly migratory species occur within the U.S. exclusive economic zone off the coast of California. These sensitive habitats are described more fully in the Final GBSD Test EA/OEA (DAF 2021).

3.3.2 Resources Excluded from Detailed Analysis

Air quality, airspace management, cultural resources, geology and soils, hazardous materials and waste, health and safety, infrastructure, land use, noise, socioeconomics and environmental justice, transportation, coastal zone management, water resources, and visual resources were not analyzed further because no significant impacts to these resources are anticipated as a result of implementing the Proposed Action.

While isolated land areas are present in the Pacific Ocean, flight paths are designed to avoid inhabited areas, resulting in negligible potential impacts to land-based resources (cultural resources, geology and soils, infrastructure, land use, noise, socioeconomics and environmental justice, transportation, coastal zones, and visual resources). Boosters and debris are expected to impact BOAs only. Impacts to water resources are discussed with biological resources.

The Proposed Action may require the use of vessels and aircraft, which are mobile sources of air emissions. It is anticipated that the emissions from these sources within the BOA would be minor and short-term. No exceedances of air quality standards are expected. There would be no fugitive dust or other airborne pollutants during terminal flight and impact activities during NGI flight tests.

Short-term, negligible impacts on airspace would be expected within the BOA of the Pacific region. Impacts to airspace over the BOA from missile testing activities have been described and analyzed in earlier EAs and EISs, including the GMD Extended Test Range Final EIS (USASMDC 2003), the Minuteman III ICBM Extended Range Flight Testing EA (DAF 2006), the Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support EA (MDA 2017) and Supplemental EA (MDA 2021), and the Final GBSD Test EA/OEA (DAF 2021). These documents concluded that given the limited number of jetways over the Pacific Ocean; the speed at which missiles move away from the launch area; the ability of VSFB to schedule restricted military airspace over the ocean range; and range safety and notification requirements and procedures, there would be minimal impacts on the use of airspace by commercial or general aviation aircraft during missile flight tests. Consistent with previous and ongoing launches from VSFB, NGI flight tests would be conducted in accordance with established FAA, International Civil Aviation Organization, and DoD navigation and airspace safety policies and procedures. Close coordination between the launch operations manager at VSFB and the responsible ARTCC, and the application of existing range safety and notification requirements, minimize potential impacts on the use of airspace by general aviation during flight tests. Existing Warning Areas[9] are in

[9] Warning areas are airspace of defined dimensions that extend from 3 nm outward from the coast of the U.S. that contain activities that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

place off the coast of California and Hawaii to alert pilots to potential dangers in the area. Prior to each flight test over the Pacific region, a NOTAM would be published to divert commercial and private aircraft from all clearance areas along the interceptor and target missile flight paths (see **Section 2.1.3.4**). The flight tests would be infrequent and short-term events, after which the airspace would be returned to the control of the responsible ARTCC.

Under the Proposed Action, no significant impacts on health and safety or hazardous materials and waste would be expected within the BOA of the Pacific region. All NGI flight tests would be conducted in accordance with established health and safety-related policies and procedures. All participating aircraft would comply with existing safety regulations. Risks to off-installation areas and non-participating aircraft, sea vessels, and personnel would be determined during the pre-flight safety analysis. Clearance areas within the BOA, including the expended booster drop zones, debris impact areas, terminal hazard areas, and flight termination boundary, would be clearly defined and communicated to the FAA, the USCG, and all appropriate emergency management agencies. NOTMARs and NOTAMs would be published to divert commercial and private aircraft and ships from all clearance areas along the flight paths. Existing Warning Areas are in place in international airspace over the Pacific Ocean to alert pilots to potential dangers in the area. Any debris that falls into the BOA would be expected to sink and would not be recovered.

4.0 Environmental Consequences

This chapter has been prepared to provide the public, agencies, and the decision-maker with an understanding of the environmental consequences resulting from the development, testing, and deployment of the new NGI system that would update and enhance the GBI weapon system. Implementation of the Proposed Action would include facility modification at VSFB and facility modification and construction at FGA. In addition, NGI AUR flight test activities would be conducted from VSFB and would occur over the BOA of the Pacific Ocean.

4.1 Vandenberg Space Force Base

4.1.1 Air Quality and Climate Variability

This analysis estimates the impacts on air quality that would result from the Proposed Action. Air emissions modeling was organized by location and activity type. Site preparations, testing, and deployment and operation would occur at VSFB. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed that ground testing would occur at the same rate (i.e., three single-launch flight tests and three ground tests of three interceptors, or three dual-launch flight tests and six ground tests of six interceptors). Air emissions modeling was performed for each of the four VSFB scenarios, which are summarized as follows:

- VSFB Scenario 1: three single-launch test events per year with air delivery of the missile transport vehicle and interceptors
- VSFB Scenario 2: three single-launch test events per year with ground delivery of the missile transport vehicle and interceptors
- VSFB Scenario 3: three dual-launch test events per year with air delivery of the missile transport vehicle and interceptors
- VSFB Scenario 4: three dual-launch test events per year with air delivery of the missile transport vehicle and interceptors

Air emissions from site preparation, testing, and deployment and operation were modeled using the DAF Air Conformity Applicability Model (ACAM), version 5.0.18a. Emissions from launch of the NGI AUR was not modeled due to the proprietary information on the NGI system. Calculation of emissions from the testing phase included transport of the missiles from the MAB or ISF to the LF(s) and placement in the silo(s), as well as transport of the missile back to the MAB following ground testing. For the purposes of the analysis, the following timeline assumptions and surrogate years were used: (1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; (2) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing and would continue indefinitely; and (3) deployment and operation at VSFB would occur as early as 2027. **Appendix C** contains the ACAM record of air analysis and record of conformity analysis reports for each VSFB scenario. **Table 4.1-1** through **Table 4.1-4** present the estimated annual net changes in emissions at VSFB from the Proposed Action under all four scenarios. These estimates are conservative, as the calculations do not subtract the emissions from ongoing testing and operations at VSFB that would stop before the Proposed Action begins (i.e., the GBI test program).

Table 4.1-1. Estimated Annual Net Change in Emissions from VSFB Scenario 1

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.214	11.389	1.560	0.338	1.592	0.718	<0.001	1,444.7
2025 (testing)	0.023	7.569	0.192	0.250	0.560	0.504	<0.001	770.1
2026 (testing)	0.023	7.569	0.192	0.250	0.560	0.504	<0.001	770.2
2027 (testing and deployment)	0.037	17.652	0.343	0.584	1.306	1.175	<0.001	1,778.8
2028 and later (testing)	0.023	7.569	0.192	0.250	0.560	0.504	<0.001	770.2
Maximum	**0.214**	**17.652**	**1.560**	**0.584**	**1.592**	**1.175**	**<0.001**	**1,778.8**
***de minimis* or PSD threshold**	**100**	**100**	**250**	**250**	**100**	**250**	**25**	**NA**
Exceeds threshold?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**NA**

Note: NA = not applicable.

Table 4.1-2. Estimated Annual Net Change in Emissions from VSFB Scenario 2

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.204	1.345	1.420	0.005	0.849	0.047	<0.001	450.6
2025 (testing)	0.015	0.036	0.087	<0.001	0.003	0.001	<0.001	24.5
2026 (testing)	0.015	0.036	0.087	<0.001	0.003	0.001	<0.001	24.6
2027 (testing and deployment)	0.018	0.067	0.096	<0.001	0.005	0.002	<0.001	37.2
2028 and later (testing)	0.015	0.036	0.087	<0.001	0.003	0.001	<0.001	24.6
Maximum	**0.204**	**1.345**	**1.420**	**0.005**	**0.849**	**0.047**	**<0.001**	**450.6**
***de minimis* or PSD threshold**	**100**	**100**	**250**	**250**	**100**	**250**	**25**	**NA**
Exceeds threshold?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**NA**

Note: NA = not applicable.

Table 4.1-3. Estimated Annual Net Change in Emissions from VSFB Scenario 3

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.234	18.917	8.059	0.586	2.151	1.221	<0.001	2,201.2
2025 (testing)	0.033	15.131	0.305	0.501	1.119	1.007	<0.001	1,526.6

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2026 (testing)	0.033	15.131	0.305	0.501	1.119	1.007	<0.001	1,526.7
2027 (testing and deployment)	0.047	25.214	0.456	0.834	1.865	1.679	<0.001	2,535.3
2028 and later (testing)	0.033	15.131	0.305	0.501	1.119	1.007	<0.001	1,526.7
Maximum	**0.234**	**25.214**	**8.059**	**0.834**	**2.151**	**1.679**	**<0.001**	**2,535.3**
***de minimis* or PSD threshold**	**100**	**100**	**250**	**250**	**100**	**250**	**25**	**NA**
Exceeds threshold?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**NA**

Note: NA = not applicable.

Table 4.1-4. Estimated Annual Net Change in Emissions from VSFB Scenario 4

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.207	1.374	1.428	0.005	0.850	0.048	<0.001	461.4
2025 (testing)	0.018	0.065	0.095	<0.001	0.004	0.002	<0.001	35.3
2026 (testing)	0.018	0.065	0.095	<0.001	0.004	0.002	<0.001	35.4
2027 (testing and deployment)	0.020	0.097	0.104	<0.001	0.006	0.003	<0.001	48.0
2028 and later (testing)	0.018	0.065	0.095	<0.001	0.004	0.002	<0.001	35.4
Maximum	**0.207**	**1.374**	**7.428**	**0.005**	**0.850**	**0.048**	**<0.001**	**461.4**
***de minimis* or PSD threshold**	**100**	**100**	**250**	**250**	**100**	**250**	**25**	**NA**
Exceeds threshold?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**NA**

Note: NA = not applicable.

Effects on air quality are evaluated by comparing the annual net change in emissions for each criteria pollutant against the General Conformity Rule *de minimis* level thresholds for nonattainment and maintenance pollutants and against the PSD threshold, as defined by USEPA, for attainment or unclassified pollutants. The PSD threshold is used as an insignificance indicator that does not denote a significant impact; however, it does provide a threshold to identify actions that have insignificant impacts on air quality. Any action with net emissions below the insignificance indicator for all criteria pollutants is considered so insignificant that the action would not cause or contribute to an exceedance of one or more NAAQS. Based on compliance with the CAAQS, the General Conformity Rule, as mirrored by SBCAPCD General Conformity regulations, is potentially applicable to emissions of volatile organic compounds (VOC) and NO_x (because they are precursors to ozone [O_3]) and PM_{10} that result from the Proposed Action at VSFB. For emissions of the remaining criteria pollutants, the PSD threshold (250 tpy for all criteria pollutants besides lead, and 25 tpy for lead) was used as an insignificance indicator to determine air quality impact significance.

Annual emissions from the Proposed Action at VSFB would not exceed the *de minimis* or PSD thresholds that apply to federal actions occurring in Santa Barbara County; therefore, impacts on air quality would be less than significant. Previous NEPA analyses of missile test launches and support operations at VSFB have determined air quality impacts from these activities to be temporary and insignificant (DAF 1997, DAF 1999, DAF 2021, USASMDC 2003). NGI testing under the Proposed Action is similar in nature to and of smaller scale than previously analyzed testing actions and therefore would also not result in significant impacts to air quality. The Proposed Action would conform to the State Implementation Plan and comply with the General Conformity Rule. No exceedance of air quality standard or health-based standards of non-criteria pollutants is anticipated.

Consistent with CEQ guidance issued on January 9, 2023, *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*, MDA has considered the ways in which a changing climate may impact the Proposed Action and change the Action's environmental effects over the lifetime of those effects. Quantification of the potential GHG emissions from NGI flight testing under the Proposed Action was not modeled due to the proprietary information regarding the NGI fuel mix; however, expected emissions from NGI flight testing are understood to be similar to those generated from operation of the recently analyzed Minuteman III. CO_2e emissions from site preparation, transport of the NGIs and missile transporter for testing, and NGI deployment at VSFB were calculated to represent GHG emissions.

CO_2e emissions from site preparations, testing, and deployment at VSFB were calculated to represent GHG emissions of the Proposed Action. **Table 4.1-5** presents an estimate of the social cost of GHG emissions from existing operations at VSFB in 2026 (not including the Proposed Action) using the total allowable annual GHG emissions from VSFB under the current operating permit and the social costs for emissions year 2026 estimated by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG 2021). The social cost of GHG emissions from the Proposed Action between 2024 and 2028, under all four scenarios, was then compared to the social cost of GHG emissions from existing actions at VSFB (**Table 4.1-6**). Estimated net CO_2e emissions and associated social cost calculations are provided in **Appendix C**.

Table 4.1-5. Estimated Social Costs of GHG Emissions from VSFB in 2026

Greenhouse Gas	Estimated Total Annual Emissions (metric tons) [a]	2026 Social Cost Rates (in 2020 dollars per metric ton of gas) [b]		Estimated 2026 GHG Social Costs (in 2020 dollars) [c]	
		5% Discount Rate	2.5% Discount Rate	5% Discount Rate	2.5% Discount Rate
Carbon Dioxide (CO_2)	68,007.0	$17.41	$84.26	$1,183,865.28	$5,730,063.00
Methane (CH_4)	106.4	$829.06	$2,285.85	$88,224.71	$243,248.76
Nitrous Oxide (N_2O)	810.5	$6,991.27	$30,471.17	$5,666,110.24	$24,695,517.33
Total	-	-	-	$6,938,200.23	$30,668,829.08

Notes: GHG = greenhouse gas. "-" indicates that no estimate is determined, or not applicable.

[(a)] Calculated using the default emissions factors for distillate fuel oil no. 2 (for stationary sources) and for diesel fuel and diesel-powered construction/mining equipment (for mobile sources; USEPA 2023).

[(b)] Total emissions are federal potential to emit GHGs per VSFB's Part 70 permit, last reissued in June 2023.Does not include the Proposed Action.

[(c)] Annual unrounded estimates for the social cost of carbon, methane, and nitrous oxide (OMB 2021).

Table 4.1-6. Estimated GHG Emissions at VSFB from the Proposed Action between 2024 and 2028 and Associated Social Cost

Scenario	Total Net CO_2e (metric tons) [a]	Social Cost of GHGs (in 2020 dollars) [b]		Compared to 2026 Social Cost of GHGs for VSFB	
		5% Discount Rate	2.5% Discount Rate	5% Discount Rate	2.5% Discount Rate
VSFB Scenario 1	5,020.3	$86,499	$361,714	1.25%	1.18%
VSFB Scenario 2	509.3	$8,320	$40,590	0.12%	0.13%
VSFB Scenario 3	8,451.8	$145,625	$614,557	2.10%	2.00%
VSFB Scenario 4	558.3	$9,165	$44,201	0.13%	0.14%

[(a)] Total Net CO_2e accounts for CO_2e emissions between 2024 and 2028 and does not account for emissions that could continue past 2028 (i.e., NGI testing activities that would occur indefinitely).
[(b)] Values were calculated using social cost of GHG rates for emissions years 2024 through 2028 and are shown are in 2020 dollars.

Because the air impact from the Proposed Action would be consistent with ongoing activities at VSFB, it is assumed that the Proposed Action would represent a negligible to minor increase in the overall social cost of GHG emissions from VSFB. Based on these calculations, the social cost of GHG emissions at VSFB from site preparations, testing, and deployment between 2024 and 2028 is estimated to be between approximately $8,320 and $614,560, which would represent between approximately 0.12 and 2.10 percent of the social cost from existing GHG emissions at VSFB.

4.1.1.1 Site Preparations

Direct impacts to air quality would occur as a result of a temporary increase in emissions (i.e., fugitive dust, volatile organic compounds, nitrogen oxides, GHGs) from the use of construction equipment and vehicles during site preparations, occurring in 2024. Silo modifications, including to the area around the LFs, would require equipment use on the gravel pad, which may contribute to fugitive dust and combustion emissions from equipment engines. Facility modifications would largely occur within existing buildings, which would not require heavy machinery or ground disturbance. Modifications to the off-base storage warehouse(s) would also occur within an existing facility or facilities and cause only minor to minimal impacts to air quality. Estimated emissions from site preparations are shown in **Table 4.1-1** through **Table 4.1-4**. These emissions would not exceed the *de minimis* or PSD thresholds; therefore, impacts on air quality from site preparations would not be significant.

Construction-related emissions would be short-term and confined to the construction site area. Emissions from construction would be minimized through implementation of best management practices (BMPs) and standard VSFB measures, including proper operation and maintenance of equipment and measures to control fugitive dust. Proper ventilation would be ensured in all construction zones within buildings.

4.1.1.2 Testing

Direct impacts to air quality would occur from temporary increases in emissions during use of air or ground vehicles for NGI transport to VSFB and the use of the missile transporter during pre-testing activities and ground testing, and from launch of the NGI during flight testing. Estimated emissions from air or ground transport and personnel changes required for the testing phase are shown in **Table 4.1-1** through **Table 4.1-4**. Impacts would be short-term and localized to the installation. Such emissions from testing activities would not exceed the *de minimis* or PSD thresholds; therefore, impacts on air quality from site preparations would not be significant.

Pre-launch and post-launch support activities have the potential to result in low emissions of volatile organic compounds due to the use of cleaning solvents, oil and lubricants, and paints and thinners (DAF 1997). The primary criteria pollutants emitted during missile launches include carbon monoxide and particulates. In addition to criteria pollutants, the products of combustion would also include aluminum oxide, hydrogen chloride (HCl), hydrogen, nitrogen, carbon dioxide, and water (MDA 2017).

Prior NEPA analyses have evaluated missile launches for missiles ranging from approximately 8 to 210 feet, with a worst-case scenario of 375,000 pounds of solid rocket fuel per missile (DAF 1997, DAF 1999, DAF 2021, MDA 2017). The NGI would have a maximum explosive weight of approximately 150,000 pounds, which is relatively comparable to other currently deployed interceptors and ICBM systems (see **Table 2.1-2**). Missile launches are short-term, discrete events, thus allowing time between launches for propulsion fuel combustion emissions to disperse. Air quality impacts from prior VSFB target launches have been determined to be insignificant (DAF 1997, DAF 1999).

The Proposed Action includes up to three flight tests per year at VSFB. An average of eight missile launches per year currently occur at VSFB. As GBI flight tests would conclude prior to the commencement of NGI flight tests, the number of missile test launches occurring annually from VSFB would decrease under the Proposed Action. Based on historical data for the exhaust emissions of four Minuteman III launches, the exhaust emissions from 61 individual flight tests are below the applicable *de minimis* or PSD thresholds for each criteria pollutant. As such, emissions from the proposed launch activity would not result in significant impacts on air quality.

4.1.1.3 Deployment and Operation

Up to four interceptors could be emplaced at VSFB, which is consistent with the 2003 GMD EA, which proposed the use and/or modification of four existing missile silos for the GMD program. Operational manpower would be consistent with current manpower levels at VSFB. Transport of interceptors to VSFB would be by aircraft or large trailers, which would generate temporary aircraft or vehicle emissions that would be minimal. Estimated emissions from air or ground transport required for deployment are shown in **Table 4.1-1** through **Table 4.1-4**.Such emissions would not exceed the *de* minimis or PSD thresholds; therefore, impacts on air quality from deployment would not be significant.

The NGI launches during full operation would generate more emissions due to an increase in their fuel compared to current interceptors; however, actual operational launches would not be expected. The proposed NGI is expected to integrate with the current GMD system and therefore would not result in a significant impact, consistent with the previous NEPA analyses.

The changing global climate is not anticipated to impact the Proposed Action or to change the effects of the Proposed Action over the lifetime of those effects. The changing climate is expected to bring increased severity to weather events, sea level rise, and rising air temperatures (CEQ 2023); however, these changes are not expected to occur within a timeframe that would affect the ability to execute the Proposed Action as described, nor are the potential impacts of the Proposed Action expected to change as a result of these global climate changes.

4.1.2 Biological Resources

Impacts to biological resources within the ROI from the Proposed Action would be minimal and intermittent and temporary to short-term. The potential stressors to biological resources from the Proposed Action at VSFB would include construction noise during site preparations and launch noise, heat and harmful chemicals from exhaust emissions, and the potential for propellant release in the event of a launch failure or termination during the flight tests.

4.1.2.1 Site Preparations

Modifications to the silos at LF-23 and LF-24 would generate construction noise. Construction noise levels would be likely be above ambient noise levels for wildlife, but only within a few hundred feet of average construction equipment. Construction noise may disturb wildlife; however, effects would be limited to short duration behavioral response such as startle response or leaving the construction area. Furthermore, there is some evidence that certain wildlife, including birds, may acclimate or become habituated to noises after frequent exposure and cease to respond behaviorally (California Department of Transportation 2016). Site preparations would cause minimal, short-term impacts to biological resources.

No changes to current maintenance activities or facility footprints would occur, including at the LFs. As such, no impacts to Gaviota tarplant would occur as a result of site preparations.

4.1.2.2 Testing

Impacts to vegetation and wildlife at VSFB, including federally listed threatened and endangered species, from flight test events have been analyzed in previous NEPA documents including the Final GBSD Test EA/OEA (DAF 2021) and the GMD Extended Test Range Final EIS (USASMDC 2003). These findings are summarized here.

4.1.2.2.1 Pre-Launch Activities

Vegetation

Pre-launch preparations would include the maintenance of firebreaks around LF-23 and LF-24. Pre-launch activities would include intermittent use of vehicles and equipment on existing paved and gravel areas. Routine maintenance of firebreaks around the LFs minimizes the potential for potential impacts to vegetation by reducing vegetation exposure and reducing the risk of wildfire.

Gaviota tarplant has been documented at LF-24 (see **Figure 3.1-2**) and may occur within the managed firebreaks around the LFs. Periodic mowing and other vegetation maintenance would thus have an “adverse effect” on the species (USFWS 2015). However, these firebreaks are routinely maintained by the DAF and maintenance is conducted using minimization measures to avoid and reduce adverse effects on Gaviota tarplant (USFWS 2015). In its 2018 re-initiation of the 2015 Programmatic Biological Opinion for base-wide operations and maintenance at VSFB (USFWS 2015, USFWS 2018), the U.S. Fish and Wildlife Service (USFWS) determined that these actions would not reduce the reproduction, numbers, or distribution of this species. Firebreak maintenance would continue under the terms of the 2018 Biological Opinion and subsequent updates to required mitigation and conservation measures.

Wildlife

Pre-launch activities would generate noise from human activity and equipment operation. These activities would be of shorter duration and of less intensity than the construction activities discussed in **Section 4.1.2.1**. Impacts to wildlife in the immediate vicinity of the LFs would be minimal and short-term.

4.1.2.2.2 Test Launches

Vegetation

Heat and emissions from launch vehicle exhaust have the potential to damage nearby vegetation. However, previous analyses of launch activities have concluded that these effects on vegetation are temporary (DAF 2021). Routine maintenance of firebreaks around the LFs and test pads at VSFB minimizes the potential for impacts to vegetation by reducing vegetation exposure and reducing the risk of wildfire. Proposed launch activities are not expected to change the abundance or distribution of any plant species or vegetation type at VSFB.

Wildlife

Wildlife may be exposed to elevated noise and visual disturbance from vehicle launch and overflight, launch emissions, and contact with fragments or hazardous chemicals in the event of a launch failure or early flight termination. Impacts associated with these activities would be minimal, intermittent, and temporary.

Elevated Noise Levels and Visual Disturbance. The primary potential for impacts to wildlife would be from the noise created during the proposed missile launches. The NGI AUR are expected to have similar launch characteristics as other missiles (i.e., Minuteman III ICBMs and GBIs) that are routinely launched from VSFB. Missile and rocket launches from north VSFB generate noise levels up to 140 dBA in the vicinity of the launch that last for approximately 20 seconds (DAF 2021; see **Section 3.1.7**). The level of noise generated by the NGI flight tests is expected to be relatively similar to or less than the Minuteman III and relatively short in duration. As GBI flight tests would conclude prior to the commencement of NGI flight tests, the number of missile test launches occurring annually from VSFB would decrease under the Proposed Action.

Wildlife exposed to launch noise may exhibit behavioral or physiological responses. The degree of the response depends on the amplitude, duration, and frequency of the noise, the hearing sensitivity of the wildlife species, and how frequently the launch noise is generated. Most wildlife species of concern at VSFB would be sufficiently far from the launch sites that impacts would be expected to be temporary and minimal (USSF 2021). The species of most concern relative to disturbance from launch activities include federally listed threatened and endangered species (discussed later in this section) and Marine Mammal Protection Act protected marine mammals hauled out near launch sites. Launch activities would be part of ongoing operations at VSFB and the DAF, the National Marine Fisheries Service (NMFS), and the USFWS have evaluated the impacts of ongoing launch activities on federally listed species and protected marine mammals in several documents (e.g., NMFS 2019, DAF 2018, DAF 2021, USFWS 2015, USFWS 2018).

Due to the potential disturbance of marine mammals from all types of vehicle launches at VSFB, the DAF has consulted with NMFS and has obtained a Letter of Authorization (LOA) for the incidental take by Level B harassment permit of Pacific harbor seals, California sea lions, northern elephant seals, Guadalupe fur seals, and Steller sea lions (NMFS 2019). The current LOA is valid through April 2024; 30 CES/CEI has applied for an updated LOA (USSF 2023). While take by Level B harassment is not expected for the Proposed Action, NMFS has concluded that any permitted takes by Level B harassment due to test activities at VSFB would have no more than a negligible impact on the affected species and stocks (NMFS 2019). The DAF has conducted years of biological monitoring during missile launches and because there has been little recorded disturbance of hauled out pinnipeds during missile launches, there is no requirement for monitoring of existing missile launches (DAF 2018). All required marine mammal monitoring and reporting would comply with all NMFS regulations and Letter of Authorization requirements. Any additional NEPA or environmental analysis and permits would be completed as necessary in coordination with VSFB staff once a launch plan is created.

Launch Emissions. It is expected that the NGI would use a solid booster propellant fuel similar to that used in the Minuteman II/III and GBI. The maximum explosive weight of the NGI AURs, and, correspondingly, the quantities of emissions that would be produced, are expected to be greater than those of Minuteman III and GBI, but less than the Peacekeeper (see **Table 2.1-2** in **Section 2.1.1.3**). Primary first-stage launch emissions from solid propellant fuel include carbon monoxide, nitrogen oxides, aluminum oxide, and HCl. HCl gas forms hydrochloric acid in the presence of moisture; therefore, atmospheric deposition of these launch emissions, particularly HCl, has the potential to acidify surface waters. The HCl would cause a change in pH of only short duration, and any alteration of the water's pH would be almost imperceptible (USASMDC and Teledyne Brown Engineering, Inc. 2019). Furthermore, the proximity of the LFs to the ocean, combined with the prevailing onshore winds, causes the deposition of acid-neutralizing sea salt in the area. The alkalinity derived from sea salt should neutralize the acid falling on soil, thus eliminating the potential for acid runoff (USASMDC and Teledyne Brown Engineering, Inc. 2019). Monitoring conducted on VSFB's South Base where launch systems larger than Minuteman III are used has not shown any long-term acidification of surface waters (USASMDC and Teledyne Brown Engineering, Inc. 2019). The small quantities of HCl that could potentially be deposited are not expected to injure or affect wildlife in Shuman Creek.

Launch Failure or Early Flight Termination. A failure during launch is unexpected but is possible. Data for Minuteman III launches show that the probability of an aborted ICBM launch is very low, with a 4 percent failure rate for Minuteman III ICBM launch vehicles (USASMDC and Teledyne Brown Engineering, Inc. 2019). If a launch failure or early flight termination were to occur, the interceptor would fall within the flight termination boundary and the NGI components, as well as any chemicals contained in the vehicle, would be introduced into the surrounding habitats. Depending on when the failure or termination occurred components and debris could fall on land between the launch pad and the coast or into marine waters. Terrestrial habitats between LF-23 and LF-24 and the ocean include grasslands, dunes, beach, and a small dune swale wetland, as well as an unnamed intermittent drainage. However, in the unlikely event of a launch mishap, in most cases the errant missile would be moving at a rapid rate such that pieces of propellant and other debris would strike the ocean farther downrange in deeper waters. The debris would be widely scattered and would be expected to sink, which would reduce the possibility of toxic materials being ingested by feeding animals.

It is assumed that the NGI AURs would use a solid fuel booster propellant composed of ammonium perchlorate, aluminum, and HTPB similar to that used for GBI, Minuteman II/III, and Peacekeeper (see **Section 2.1.1.1**). Any unburned propellant could be widely dispersed in the event of a launch failure or flight termination and the ammonium perchlorate would have the potential to leach out and create toxic conditions for plants and animals in terrestrial or marine habitats. Laboratory studies have shown that in freshwater at 68° Fahrenheit, leaching of all the perchlorate from solid propellant fragments can take many years and that rates are even slower at lower water temperatures or in more saline waters (USASMDC and Teledyne Brown Engineering, Inc. 2019).

The DACS propulsion system in the NGI payload may use a liquid propellant similar to that used in the GBI payload. Each NGI AUR could contain up to 48 gallons of MMH/N_2O_4 or MMH/MON-25 (see **Section 2.1.1.2** for a description of the payload propellant). The effects of these chemicals on animals are not well understood; however, if unburned liquid propellant were deposited in the marine environment the nitrogen oxide binder would quickly form nitric acid and nitrous acid in water and the hydrazine fuel would quickly oxidize into amines and amino acids (USASMDC and Teledyne Brown Engineering, Inc. 2019). Although unlikely, there is short-term potential for marine animal exposure to harmful levels of these substances, but these quantities would be quickly diluted and buffered by the large volume of seawater (Lang et al. 2003). If a solid propellant is used for payload propulsion, the propellant composition would be similar to that proposed for use in the boosters and would have similar impacts as described in the previous paragraph.

If an early abort were to occur, VSFB personnel would take immediate action to recover and clean up any debris, including unburned propellants or other hazardous materials, that had fallen on VSFB lands, in shallow nearshore ocean waters up to 6 feet deep, or in any freshwater creeks, retention ponds, and wetland areas. Cleanup and recovery from deeper coastal waters would occur on a case-by-case basis to minimize potential harm to biological resources while balancing human health, safety, and mission requirements. Any liquid or solid propellant falling in the offshore waters would be subject to continual mixing and dilution due to the ocean waves and currents, and hence, local accumulation of percolates contained in the propellants is unlikely. NASA has conducted a thorough evaluation of the effects of missile systems that are deposited in seawater. It concluded that the release of hazardous materials aboard missiles into seawater would not be significant, as materials would be rapidly diluted and missile components would immediately sink to the seafloor out of reach from marine mammals, sea turtles, and most other marine life (U.S. Department of the Navy 1998).

Given the low probability of a launch failure or early flight termination based on previous GMD launches at VSFB and the relatively low potential for effects to biological resources, no significant impact on biological resources would be expected.

Federally Listed Threatened and Endangered Species

The types of potential stressors for federally listed threatened and endangered species from flight test activities at VSFB would be the same as those described for vegetation and wildlife above. The DAF has consulted with the USFWS and NMFS on the effects of base-wide operations, including ICBM launches, on Endangered Species Act-listed species. California red-legged frogs have not been observed within the area of the LFs and are highly unlikely to be present, but the Proposed Activity may disturb or be fatal to California red-legged frogs if individuals disperse from distant appropriate habitat during periods of high rainfall. With implementation of measures identified in the 2018 USFWS Programmatic Biological Opinion, the USFWS concluded that missile launch activities within the scope specified would not jeopardize the continued existence of federally listed species, including red-legged frogs (USFWS 2015, USFWS 2018). The Proposed Action would implement relevant avoidance and minimization measures specified in the USFWS Programmatic Biological Opinion (USFWS 2015, USFWS 2018).

On December 5, 2023, 30 CES/CEIEA sent a letter to USFWS describing the Proposed Action and notifying USFWS that 30 CES/CEIEA has determined that the project is likely to adversely affect Gaviota tarplant and California red-legged frog. The USFWS concurrence letter authorizing the project under the 2018 Programmatic Biological Opinion is included in **Appendix A**. Impacts to sensitive species from NGI flight tests may require additional NEPA or environmental analysis or additional consultation with the USFWS, which the MDA would revisit with VSFB staff when a launch plan has been created.

Sensitive Habitats

Interceptor components and/or debris could fall into designated essential fish habitat or critical habitat within the flight termination boundary in the event of a launch failure or early flight termination. In the unplanned and unlikely event that launch debris would fall on VSFB lands or in shallow nearshore ocean waters up to 6 feet deep, VSFB personnel would take immediate action to recover and clean up any debris. As described for wildlife above, effects on these habitats would not be significant.

4.1.3 Coastal Zone Management

As discussed in other sections of **Section 4.0**, the Proposed Action would not result in significant impacts to sensitive biological or cultural resources, including coastal zone resources. The Proposed Action would not have lasting effects on the scenic beauty along the coast.

The areas of VSFB that would be utilized under the Proposed Action are located within VSFB's boundary and are owned by the DoD. Although the CZMA excludes federal lands from the coastal zone, actions on DoD lands that may affect resources within the coastal zone must be reviewed for consistency with the CCMP. The Proposed Action may affect coastal use or resources within the coastal zone and therefore is subject to consistency review for the applicable CCA provisions.

4.1.3.1 Site Preparations

Under the Proposed Action, modifications would be made to several existing facilities on North VSFB. Minor internal and external modifications would be made to two launch facilities (e.g., LF-23 and LF-24), and minor internal modifications would be made to Building 1819. All modifications to these facilities would be limited to the existing footprints, and no new ground disturbance would be required. These facilities are not within the coastal zone, and no impacts to coastal resources are anticipated. Although the off-base storage location(s) has not been identified, the facility or facilities would likely be outside the coastal zone.

4.1.3.2 Testing

The Proposed Action would result in up to three NGI flight tests each year beginning as early as 2026, during which Point Sal State Beach may be closed for up to 48 hours per flight test for public safety purposes. Because access restrictions would be temporary and occur only a few times per year, the Proposed Action would not significantly affect local recreation. There would be no additional restrictions to public access at Point Sal State Beach or to any other public beaches at or near VSFB beyond what is already agreed to in existing county or state agreements.

4.1.3.3 Deployment and Operation

Under the Proposed Action, the DAF would continue to comply with the Federal Coastal Zone Consistency regulations (14 CFR Part 930) and the CCMP. Although facilities at VSFB would be used to support a new flight test program, the types of operations and maintenance activities proposed the occur would be similar to that of their current or prior usage. Because the overall proposed activities would not have a significant impact on physical and natural resources, require implementation of new restrictions to beach access or other recreational areas, or adversely affect the visual qualities of the coastline, DAF concluded that the NGI test program-related activities would be consistent with the state-based policies of the state's certified program and would not adversely affect coastal zone resources. To comply with the program's requirements, 30 CES/CEIEA submitted an ND to the CCC requesting concurrence pursuant to NOAA's implementation regulations (15 CFR Part 930.35(d)). The CCC provided a letter of concurrence on June 20, 2024, which is included in **Appendix A**.

4.1.4 Cultural Resources

There are no known historic properties within the APE for the Proposed Action at VSFB. Therefore, the Proposed Action would have no impacts on known historic properties. Under Section 106 of the NHPA and its implementing regulations, an adverse effect is found when an undertaking (or action) may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for NRHP eligibility in a manner that would diminish the property's historic integrity of location, setting, feeling, association, design, materials, or workmanship. Examples of adverse effects on cultural resources under Section 106 can include physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or auditory elements that are out of character with the property or that alter its setting; neglecting the resource to the extent that it deteriorates or is destroyed; or the sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance. Adverse effects determined under Section 106 may or may not be considered significant impacts under NEPA and considerations include the type, duration, and severity of the impacts as well as mitigation measures developed through Section 106 consultation.

Should inadvertent discoveries be made during construction or demolition, the standard operating procedures for inadvertent discoveries of archaeological resources outlined in the installation's ICRMP would be implemented.

4.1.5 Hazardous Materials and Hazardous Waste Management

Hazardous materials would be used or handled during site preparations at VSFB, testing at VSFB, deployment and operation at VSFB, and transport of interceptor or interceptor components for testing and deployment. Hazardous materials and waste management would be performed in accordance with ongoing VSFB procedures, as well as applicable federal, state, and local regulations, and pre-coordinated with the 30 CES/CEIEC Hazardous Waste Program Manager.

The volume of hazardous material and waste used or generated as a result of the Proposed Action would be relatively small. With implementation of the best management practices (BMPs) and requirements in the hazardous materials and waste management plans described below; as well as adherence to applicable federal, state, and local regulations; impacts to the environment are not expected from the presence of potentially hazardous materials and the generation of wastes associated with the Proposed Action.

4.1.5.1 Site Preparations

As described in **Section 2.1.2.1**, two existing GBI test LFs and a number of existing buildings at VSFB would be used for the NGI. The GBI silos and some of the buildings would require modifications as part of site preparation, but no new buildings would be constructed. None of the buildings or other facilities at VSFB that may potentially be used for the NGI are located within an active IRP site or known/suspected contamination site. In the event that contaminated soil is encountered in the course of grading or excavating, it would be properly managed and disposed of.

Site preparations would require handling, use, storage, and disposal of hazardous materials. Hazardous materials and waste anticipated to be used or encountered include paints, thinners, solvents, adhesives, fuels, lubricants, coolants, used oil, and soiled rags. A list of hazardous materials used would be provided with associated safety data sheets to the HazMART. Hazardous waste would be handled, stored, and disposed of by authorized personnel under VSFB's Hazardous Waste Management Plan. All hazardous waste generated on VSFB, whether disposed by the contractor or disposed through the Consolidated Collection Accumulation Point contractor, requires coordination and characterization with Consolidated Collection Accumulation Point personnel prior to transport and disposal. Storage tanks and oil or fuel containers larger than 55 gallons would comply with VSFB Spill Prevention, Control, and Countermeasure Plan requirements.

All federal, state, and DAF regulations with regard to ACM or lead-based paint would be followed by VSFB personnel or contractors, as applicable. Asbestos disturbance, abatement, and demolition work orders, work clearances, and projects must be reviewed by 30 CES/CEIEC. Other regulations that may apply are OSHA asbestos standards in 29 CFR Part 1910 and construction industry regulations in 29 CFR Part 1926, EPA provisions under 40 CFR Part 763 for asbestos worker protections and banned asbestos-containing products, and the California Division of Occupational Safety and Health asbestos regulations in 8 California Code of Regulations. ACM surveys would be conducted prior to building renovations and all regulatory notifications and abatement plans would be reviewed by 30 CES/CEIEC. Lead-based paint and ACM are not expected to be encountered during silo modifications. PCBs are not expected to be encountered during any facility modifications.

Although unlikely, should contamination be discovered in the shallow subsurface during site preparation, sampling would be conducted to determine the location and whether concentrations are above regulatory limits. Any subsurface contamination would be managed and disposed of by authorized installation personnel, and suitable clean fill would be brought in as a replacement as needed.

Off-base storage facilities would require minor improvements and/or modifications. While the specific facility has not been identified, it is anticipated that a modern facility would be selected and hazardous materials such as ACM, lead-based paint, or PCBs would not be present.

4.1.5.2 Testing

As described in **Section 2.1.3.1**, the NGI would be transported in military aircraft to VSFB for testing. Transport could also be accomplished by ground via the Interstate Highway System for part or all of the distance to VSFB. Shipping would be conducted in accordance with applicable DAF, FAA, and/or DOT regulations, and all required permits would be obtained. Applicable safety regulations would be followed in the transport, receipt, storage, and handling of hazardous materials, which includes the booster's class 1.3 HTBP solid propellant and the payload propellant. Additionally, storage and handling of all hazardous substances would comply with the Emergency Planning and Community Right-to-Know Act and would follow all installation procedures for reporting.

Hazardous materials used on site during testing would include cleaners, solvents, lubricants, motor fuel, and diesel. These materials would be handled, used, stored, and disposed of by authorized personnel under VSFB's Hazardous Waste Management Plan. Ground testing would use ionized water to simulate fuels; therefore, there would be no hazardous fuels for ground testing the NGI.

Blast residue generated by the NGI AUR flight tests would be contained within the silo and canister, removed, and containerized. Blast residue would be properly disposed of as hazardous waste, according to local, state, and federal regulations.

As discussed in **Section 2.1.3.4.3**, solid propellant target missiles would be used in the planned flight tests. The target missiles may contain simulated NBC agents that could include water, tri-butyl phosphate, diatomaceous earth, or other materials. No live NBC agents would be used during flight test activities.

Other hazardous material could be generated during testing in the event of a test mishap, as described in more detail in **Section 4.1.6.2.3**. Any debris falling on VSFB lands would be handled in accordance with existing emergency response plans. Any unburned propellant and any other hazardous materials that were to fall on land or off the beach in waters up to 6 feet deep would be recovered. Any recovery from deeper water would be treated on a case-by-case basis.

4.1.5.3 Deployment and Operation

Routine operations and maintenance of the proposed NGI system would likely require the use of hazardous materials and generate small quantities of both hazardous waste and non-hazardous waste. The types of hazardous materials used (such as cleaners, solvents, lubricants, and fuels) and the hazardous wastes generated would be similar to those currently used and generated at VSFB. All hazardous waste and materials would be managed in accordance with VSFB regulations and policies as described in **Section 4.1.5.1**. Additionally, storage and handling of all hazardous substances would comply with the Emergency Planning and Community Right-to-Know Act and would follow all installation procedures for reporting.

4.1.6 Health and Safety

With implementation of the health and safety regulatory requirements and procedures, activities associated with the Proposed Action would pose minimal risk to the health and safety of military personnel, contractors, and the general public.

4.1.6.1 Site Preparations

As described in **Section 2.1.2.1**, two existing GBI test LFs and a number of existing buildings at VSFB would be used for the NGI. The GBI silos and some of the buildings would require modifications as part of site preparation, but no new buildings would be constructed. As stated in **Section 4.1.5.1**, work would not be conducted in any IRP areas.

Potential health and safety risks to military personnel and contractors during site preparation activities would be the same as those during routine construction and maintenance operations. NGI site preparation activities would be performed in accordance with ongoing VSFB procedures described under **Section 3.1.6**, as well as applicable federal, state, and local regulations.

4.1.6.2 Testing

As described in **Section 2.1.3.1**, the NGI would be transported in military aircraft to VSFB for testing. Transport could also be accomplished by ground via the Interstate Highway System for part or all of the distance to VSFB. Shipping would be conducted in accordance with applicable DAF, FAA, and DOT safety regulations, and all required permits would be obtained.

4.1.6.2.1 Ground Testing

Ground testing of the NGI would use inert materials such as ionized water to simulate fuels. With no fuels, risks to health and safety of staff operating the ground tests are expected to be similar to those from activities such as handling large equipment and using machinery. Impacts to staff would be minimized by following proper safety standards for operating and working around large machinery.

4.1.6.2.2 Flight Testing

An appropriate ESQD zone would be established around facilities at VSFB where NGI AURs and propellant are stored or handled in order to account for the possibility of an unplanned event. All ESQD zones would be approved by the DoD Explosives Safety Board and would fall within the installation boundary. As described in the NMD Deployment EIS (USASMDC 2000), the potential for an explosion is very small, and tests have shown that the interceptor would most likely burn, not explode, during a mishap. The NGI AUR would not contain an explosive warhead.

Propellant fueling, if conducted at VSFB, would follow all applicable health and safety requirements. An indoor release of liquid propellants could result in localized concentrations that exceed both the Immediately Dangerous to Life or Health or Permissible Exposure Limit for workers (MDA 2018). Risk from an inadvertent release would be mitigated by design of the existing and any new storage facilities, atmospheric monitoring, protective packaging during transport, and operating procedures that are currently in place at VSFB. Applicable safety regulations would be followed in the transport, receipt, storage, and handling of hazardous materials. Storage and handling of all hazardous substances would comply with the Emergency Planning and Community Right-to-Know Act and would follow all installation procedures for reporting.

Prior to each flight test, the Flight Safety Analyst would define which airspace areas would be affected and the Range Safety Officer would coordinate with the FAA and the USCG to address any issues of concern. A standard sequence of notification and coordination procedures between the Range Safety Officer and the agencies would enforce the clearance of land, air, and sea areas as described above under **Section 3.1.6.2**. Such actions involve the temporary closure of relatively large, static volumes of airspace and ocean areas (i.e., hazard areas) in advance of a launch, reentry, or other rocket operations to protect air and ocean traffic from the hazards of flight activities and vehicle failures, including falling debris. Public access to Point Sal State Beach may be closed for up to 48 hours to protect public health and safety (see **Section 4.1.3**).

Implementation of these regulatory requirements and procedures ensures that there would be minimal risk to the health and safety of military personnel and contractors, as well as to the general public, from testing operations and activities on or off the installation.

4.1.6.2.3 Test Mishaps

Test mishaps would be defined in terms of three scenarios: missile failure on the launch pad, termination of a flight shortly after liftoff, and termination of a flight after the missile has left the vicinity of the launch pad. Launch scenarios would be planned to ensure that any debris from a mishap would fall within the predetermined launch hazard area and flight termination boundary (see **Section 2.1.3.4.1**). Safety precautions described in **Sections 2.1.3.4.1** and **3.1.6** would minimize the risk to test support personnel and the general public should a test mishap occur.

Termination of a flight on the launch pad would be characterized by either a detonation of the booster or a conflagration in which the propellant burns but does not explode. An ESQD zone surrounding the launch pad would be calculated based on the equivalent explosive force of all propellant contained in the flight vehicle. The Launch Hazard Area and launch caution corridor would be cleared of all but mission-essential personnel. A standby emergency response team consisting of firefighting, safety, and medical personnel would be located near the launch site to ensure immediate response and rapid control in the event of an accident.

Termination of a flight shortly after liftoff would result in containment of all debris within the Launch Hazard Area and/or flight termination boundary. Any debris, including unburned propellant and any other hazardous materials, falling on VSFB lands or in shallow (up to 6 feet deep) nearshore waters would immediately be removed and would be handled in accordance with existing emergency response plans. Any recovery from deeper water would be treated on a case-by-case basis.

Debris from termination of a flight after the missile has left the vicinity of the launch pad would also be contained within the flight termination boundary. Under this scenario, the interceptor would likely already be outside of the U.S. territorial seas and over the BOA, as within 1 minute after launch, the interceptor would already be 40 to 50 miles along its flight path. Any debris would fall into the Pacific Ocean, would be expected to sink, and would not be recovered.

In the event of a test mishap, the target missile(s) would continue on its flight path and terminate in the Pacific Ocean within the predefined terminal hazard area.

4.1.6.3 Deployment and Operation

Potential health and safety concerns at VSFB during deployment and operation would consist of the storage and routine maintenance of the NGI components and support equipment. Storage areas would be fenced, and appropriate placards would be used. All personnel would be properly trained in compliance with OSHA procedures and other applicable state and federal regulations and guidelines. However, the handling and assembly of missile components, accomplished within enclosed areas, has the potential to affect worker health and safety; adherence to appropriate safety regulations and operating plans and protocols would serve to maintain potential health and safety risks to mission personnel within acceptable levels. Since public access to VSFB is limited, and since ESQDs would be established around storage areas, no impact to public health and safety would be expected.

4.1.7 Noise

Analysis of potential noise impacts is based on changes to the ambient noise environment or potential changes to land compatibility from noise caused by implementation of the Proposed Action. Impacts of noise would be considered significant if the Proposed Action were to result in the violation of applicable federal or local noise regulations, create appreciable areas of incompatible land use outside the installation boundary, or result in noise that would negatively affect the health of the community. Noise impacts from the Proposed Action are expected to be insignificant.

4.1.7.1 Site Preparations

Construction-related noise impacts for the Proposed Action would be similar to those described for site preparation activities previously analyzed at VSFB (DAF 2021, USASMDC 2003). On-base construction-related noise impacts at VSFB would be short-term and minor to moderate at the localized areas on the installation where facility and infrastructure modifications are proposed to occur. No matter the location of construction activities, appropriate noise-attenuating devices, such as vehicle and equipment mufflers, and use of sound barriers would be used to the extent practicable to minimize the temporary noise effects. Operation of construction vehicles and equipment could result in temporary, negligible startle or area avoidance behaviors in wildlife near the on-base facilities that would be modified at VSFB (see **Section 4.1.2**).

Operation of construction vehicles and equipment for off-installation site preparation activities to complete minor modifications and mechanical work at nearby storage facilities would generate short-term, negligible to minor noise localized to those affected areas. Construction crews would implement the same measures off-base as used on-base to avoid or minimize noise effects on nearby individuals. Additionally, off-installation construction activities would be conducted between 7 am and 9 pm, in accordance with the Santa Barbara County Code of Ordinances, Chapter 40 – *Noise Ordinances*.

4.1.7.2 Testing

Transporting the NGI to VSFB would generate additional vehicle noise on the associated highways, if the NGI is ground transported, but would not appreciably affect noise levels along the transportation corridors.

Pre-flight-test activities would generate negligible noise (e.g., vehicles, equipment operation at the launch site) during preparations for the test event.

Consistent with existing missile launch activities at VSFB, noise generated during the proposed flight test of NGI AURs would be characterized as moderately loud to uncomfortable. Noise levels generated by the launch of NGI AURs are expected to fall within or below the noise level of previously measured Minuteman III and Peacekeeper launches. **Figure 4.1-1** depicts the noise levels produced during a single launch of a Minuteman III, as well as a single launch of a Peacekeeper. **Figure 4.1-2** shows the calculated noise levels for dual launches of two Minuteman IIIs and two Peacekeepers. These vehicles are launched from LF-03 and LF-06, which are within 1.4 and 2.9 miles of the proposed NGI flight test sites, respectively.

Because the noise associated with each flight test would be audible for only around 20 seconds and would be a continuation of existing mission activities at the installations, the resulting noise disturbance from launches would be intermittent and temporary, resulting in a finding of insignificance. Additionally, as GBI flight tests would conclude prior to the commencement of NGI flight tests, the number of missile test launches occurring annually from VSFB would decrease under the Proposed Action. Discussion of flight test noise effects on wildlife and protected species at VSFB is provided in **Section 4.1.2**. Because sonic booms associated with missile launches from north VSFB occur far from the coast over ocean waters, no appreciable noise effects on coastal California land areas or protected species would be anticipated.

4.1.7.3 Deployment and Operation

Negligible noise effects from deployment and long-term operation of the NGI at VSFB would be expected. These activities combined with the existing mission operations at VSFB would not have a significant impact on the overall ambient noise levels at or around the installation.

Data Source: World Street Map

Figure 4.1-1. Noise Levels for a Single Minuteman III or Peacekeeper Launch from LF-03

Source: USASMDC 2003

Data Source: World Street Map

Figure 4.1-2. Calculated Noise Levels for a Dual Minuteman III or Peacekeeper Launch from LF-03 and LF-06

Source: USASMDC 2003

4.1.8 Socioeconomics and Environmental Justice

The Proposed Action would have short-term, negligible, positive socioeconomic impacts within the ROI. This EA/OEA has identified no effects that would result in disproportionately high or adverse effects on minority or low-income populations in the VSFB area.

4.1.8.1 Site Preparations

Site preparations at VSFB would have short-term, positive socioeconomic impacts within the ROI. Site preparation activities at VSFB are expected to require up to approximately 20 support personnel for a period of several months. The adjacent communities would benefit socioeconomically if local contractors are hired. If workers from outside the region are used to implement the Proposed Action, positive socioeconomic impacts also would be expected, with direct benefits to accommodation, food, retail, and other industries in addition to local fiscal benefits from associated sales tax revenues.

Construction personnel would be housed in motels or hotels within the cities surrounding VSFB. Site preparation activities would cause no displacement of populations, residences, or businesses within the areas surrounding VSFB. There are numerous hotels and motels situated within the surrounding cities of Lompoc, Santa Maria, and Guadalupe, and the availability of temporary accommodations is adequate.

By spending money in the local economy, mainly via accommodation and procurement of goods and services, the additional personnel would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local communities. The overall impact would, however, be slight and would cause no population growth.

4.1.8.2 Testing

Flight testing at VSFB would require approximately 20 personnel on site during preparations for 2 weeks prior to and through the launch. Three to four additional personnel above current staffing levels would remain at VSFB. This slight increase in temporary and permanent personnel would result in short-term and long-term positive socioeconomic impacts due to the financial input of new staff into the local economy, similar to those described for site preparations. The overall impact would be slight compared to the total population and staffing at VSFB.

The Proposed Action would occur on an existing installation, and proposed activities would be conducted in a manner that would not substantially affect human health or the environment (see **Section 4.1.6**).

4.1.8.3 Deployment and Operation

Deployment would consist of interstate transportation and emplacement of the NGI at VSFB and would have no significant impacts on the socioeconomic factors described for the ROI. Long-term operation of the NGI system would be integrated with the existing GMD systems at VSFB and would require no additional staffing.

4.1.8.4 Impacts on EJ Communities

An analysis of the potential impacts of the Proposed Action on EJ was conducted in accordance with applicable regulations, including EO 12898 – *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and EO 14096 – *Revitalizing Our Nation's Commitment to Environmental Justice for All*. No effects that would result in disproportionately high or adverse effects on minority or low-income populations in the VSFB ROI were identified, including from test launch activities. Previous NEPA documents have identified no effects that would result in disproportionately high or adverse effects on EJ populations from flight test activities (DAF 2021). The activities would also be conducted in a manner that would not exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination under any program or activity receiving federal financial assistance because of their race, color, national origin, or socioeconomic status.

4.1.9 Water Resources

Impacts to water resources at VSFB from the Proposed Action would be short-term and minor to negligible.

4.1.9.1 Site Preparations

Modifications to existing facilities would not require any new ground disturbance.

Potential impacts to water resources resulting from accidental spills of hazardous materials during site preparation would be minimized because all activities would follow spill prevention, control, cleanup, and emergency response procedures described in **Section 4.1.5**. NPDES Construction General Permit coverage and an associated SWPPP may be required for construction activities that disturb 1 acre or more of soil.

4.1.9.2 Testing

VSFB would adhere to all established permits, SOPs, and regulations to maintain existing water quality. No water resources would be impacted by pre-flight test activities.

Flight tests would not be anticipated to affect water resources (DAF 2021). However, if an early launch abort were to occur, base actions would immediately be taken to remove unburned propellant and any other hazardous materials that had fallen on the beach, into waterbodies or off the beach in waters up to 6 feet deep. Any recovery from deeper water would be treated on a case-by-case basis. The risk of accidental release of hazardous materials affecting surface waters would be minor and short-term in duration. As discussed in **Section 4.1.2.2.2**, release of hazardous materials from missile components into the ocean in the event of a launch failure or early termination would not result in any significant impacts to seawater.

As discussed in **Section 4.1.2.2.2**, deposition of HCl in surface waters following flight tests would cause a very short-term change in pH and would not alter the pH of any waterbody. This impact would be anticipated to be short term and negligible.

VSFB would adhere to all established permits, SOPs, and regulations to maintain water quality health. No water resources would be impacted by post flight activities for the Proposed Action.

4.1.9.3 Deployment and Operation

Transportation, emplacement, and long-term operation and maintenance of the NGI at VSFB would not impact water resources. These activities would take place using existing infrastructure and within existing buildings at VSFB and would not result in any changes to environmental conditions that may result in impacts to water resources.

4.1.10 Cumulative Impacts

Cumulative impacts are defined by the CEQ in 40 CFR 1508.7 as “impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.” The cumulative impacts could occur as a result of multiple projects occurring simultaneously within the same vicinity. Thus, each resource is analyzed in terms of its ability to accommodate additional effects of the Proposed Action in combination with past, present, or reasonably foreseeable future projects within this timeframe.

The Proposed Action would be implemented in phases, with site preparations at VSFB beginning as early as 2024. Flight testing would likely begin in 2026 and continue indefinitely. Each resource considered at VSFB is analyzed in terms of its ability to accommodate additional effects of the Proposed Action in combination with past, present, or reasonably foreseeable future projects known at this time.

Table 4.1-7 summarizes past, present, and reasonably foreseeable future actions within the vicinity of the project area that could interact with the implementation of the Proposed Action.

Table 4.1-7. Past, Present, and Future Projects at VSFB

Action	Description of Project	Status
Recently Completed Past Actions	Past actions at VSFB are primarily tied to rocket launches, SLD 30 construction and maintenance activities, routine aircraft takeoffs and landings, and a regional energy development project. Actions recently completed at VSFB include the following: • Completed 22.5 megawatts solar farm on VSFB (30 SW Public Affairs 2017) • Completed Building 7000 on VSFB with LEED Gold certified • Military and commercial rocket launches on VSFB • Regular aircraft takeoffs and landings at VSFB	Past
GBSD Test Program	GBSD will eventually replace the aging Minuteman III ICBM system. Implementation of the test program includes facility construction or modifications as well as flight test activities at VSFB.	Present
SpaceX Falcon 9 Cadence Increase	Increase in SpaceX Falcon 9 launches up to 36 times per year. Includes first stage boost-back and landing, and additional downrange offshore landing locations on the Pacific Ocean. No change to the Falcon 9 specifications or launch/landing facilities.	Present
Other Launches	• ABL RSL Launches at LF-576E (Present) • Firefly Alpha Launches at SLC-2 (Present) • 48 Phantom Space Inc. Launches at SLC-5 (Future)	Present and Future
F15E/EX Basing	Implementation of the proposed F-15E and/or F-15EX detachment program, which would add 480 operations to result in a total of 30,166 annual operations at the SLD 30 airfield based on the following assumptions: • F-15E and/or F-15EX units would complete detachments annually at VSFB over a period of two weeks for a total of 10 operating days per detachment. • F-15E and/or F-15EX would operate on a 2 by 2 schedule, for a total of four sorties daily, and each F-15E and/or F-15EX sortie would also include two closed patterns per sortie.	Future

Sources:Final GBSD Test EA/OEA (DAF 2021); Final Supplemental Environmental Assessment Falcon 9 Cadence Increase at Vandenberg Space Force Base, California and Offshore Landing Locations, 18 May 2023 (USAF 2023).

4.1.10.1 Air Quality

Construction activities (including construction personnel) from the Proposed Action at VSFB would produce minor amounts of (1) fugitive dust emission (PM_{10}/$PM_{2.5}$) resulting from soil disturbance and (2) emissions due to the use of fuel-powered equipment. Proposed construction activities would implement the air quality minimization measures identified in **Section 4.1.1** to minimize fugitive dust emissions. The minor levels of emissions from proposed construction activities in combination with emissions from existing and future cumulative projects would not exceed NAAQS. Emission from construction would occur over a 3-year period.

The proposed NGI flight tests at VSFB would be conducted in a manner similar to current flight tests. As GBI flight tests would conclude prior to the commencement of NGI flight tests, the number of missile test launches occurring annually from VSFB would decrease under the Proposed Action. The projected change in launch activity at VSFB has the potential for additive, cumulative air quality impacts during the 2-year period. However, launch vehicle exhaust products, and other launch operation emissions, do not accumulate because winds quickly and effectively disperse them between missions. In terms of upper atmospheric effects, emissions released into the upper atmosphere would add to the overall global loading of chlorine and other gases that contribute to long-term ozone depletion. However, the amount of emissions released from rocket motors is negligible compared to losses of ozone from other global sources. Because the emissions would represent an extremely small percentage of total loading, they would not significantly contribute to the cumulative impact on stratospheric ozone.

The operation of the GMD/NGI facilities would not result in long-term new operations and increased personnel. The GHG impacts and resulting social cost of the proposed project does not result in a significant impact to the existing operations, therefore would not result in significant additional impacts or significant increased social cost.

4.1.10.2 Biological Resources

Implementation of the Proposed Action at VSFB would result in minimal and intermittent and temporary to short-term impacts on sensitive biological resources. Any potential NGI construction would have less than significant impacts on biological resources. The NGI test program and other programs would coordinate with SLD 30 Natural Resource Management to minimize the potential impacts of each program and to manage biological resources long term on VSFB under the installation INRMP (USSF 2021). The DAF has many conservation, monitoring, and management programs in place for biological resources to minimize cumulative impacts to biological resources.

Flight test programs have the potential to have additive effects on sensitive species such as hauled-out pinnipeds and nesting plovers and terns. GBI and NGI flight tests would not occur at the same time. However, the DAF has monitoring programs and procedures in place to avoid any cumulative impacts of launch activities on sensitive species at VSFB and to coordinate with the USFWS and NMFS to limit potential cumulative impacts launch activities.

Based on the robust and active management of natural resources by the DAF on VSFB, implementation of the Proposed Action would not result in significant cumulative impacts on biological resources at VSFB.

4.1.10.3 Coastal Zone Management

No significant cumulative impacts on the coastal zone, including coastal zone resources or scenic beauty along the coast, are anticipated from the Proposed Action. Cumulative impacts to biological resources and cultural resources are discussed in **Sections 4.1.10.2** and **4.1.10.4**, respectively.

Because VSFB is federal property, there is no designated coastal zone on the installation. DAF has taken many steps to protect and maintain coastal resources in collaboration with federal, state, and local agencies. This includes funding research on marine mammals and other wildlife on the installation, enforcing limited access to key wildlife areas, and minimizing the closure of public beaches.

Public notification regarding closures of Point Sal State Beach would continue to occur in accordance with existing agreements between SLD 30 and Santa Barbara County. Because beach closures associated with flight test events would be temporary and occur only up to three times per year, the access restrictions would not significantly affect local recreation. VSFB personnel consult regularly with the CCC prior to implementing new projects that might affect the state-based policies of the California Coastal Act of 1972.

4.1.10.4 Cultural Resources

No significant cumulative impacts to cultural resources are anticipated from the Proposed Action. More than 90 percent of VSFB has been surveyed for cultural resources and more than 2,500 cultural resources have been documented at VSFB, including 2,200 known archaeological sites. Known NRHP-eligible archaeological sites at VSFB are documented and managed to ensure compliance with all applicable cultural resource laws and regulations. Adverse effects on archaeological resources from individual actions or projects are typically mitigated through data recovery that often increases academic knowledge of prehistoric land uses and occupations at VSFB. Inadvertent discoveries found during future construction would trigger implementation of standard operating procedures in the VSFB ICRMP to ensure compliance with all applicable cultural resource laws and regulations.

4.1.10.5 Hazardous Material and Hazardous Waste

A small change in wastes would occur from the additional flight tests at VSFB; however, since GBI flight tests would conclude prior to the commencement of NGI flight tests, the number of missile test launches occurring annually from VSFB would decrease under the Proposed Action. Any hazardous material and waste would be properly managed in accordance with federal, state, and local regulations. No unmitigable human or environmental health risks are anticipated from pre-test preparation and support for the Proposed Action at VSFB. Therefore, no significant cumulative impacts from the management of hazardous materials and waste are anticipated.

4.1.10.6 Health and Safety

No adverse cumulative impacts on health and safety would be expected from the Proposed Action when combined with other projects at VSFB. Public health and safety would continue to be ensured through the establishment of launch clearance areas; beach and access road closures (as necessary); evacuation of offshore oil rigs (as necessary); coordination and monitoring of train traffic passing through the installation; and publishing NOTMARs and NOTAMS. Adherence to established safety procedures and regulations for construction, flight test activities, and operations would continue, reducing or eliminating health and safety impacts on contractors, military personnel, and the general public.

4.1.10.7 Noise

A short-term elevation in the noise level would occur during flight test activities. Noise levels are anticipated to return to normal ambient levels 30 seconds after each launch. Three flight tests would take place each year beginning in 2026. This would be in addition to the eight to nine GBSD and Minuteman III flight tests currently projected for each year from 2026 through 2028 (DAF 2021) and other launches described in **Table 4.1-2**. The change in the number of launches due to the Proposed Action would not have any noticeable impact on current noise levels.

4.1.10.8 Socioeconomics and Environmental Justice

Site preparations and flight test activities at VSFB would have short-term, negligible, positive socioeconomic impacts in the area due to the temporary presence of construction workers and additional support personnel and their financial input into the local economy. These impacts would be localized and limited to the region surrounding the installation and would end when construction was completed. Deployment and operation of the NGI would not impact socioeconomic factors. Because the Proposed Action would not require additional permanent staff at VSFB, it would not contribute to adverse cumulative impacts on housing availability in the municipalities surrounding VSFB (DAF 2021).

The Proposed Action would not result in disproportionately high or adverse cumulative effects on minority or low-income populations in the VSFB ROI.

4.1.10.9 Water Resources

Short-term cumulative impacts to water quality from proposed construction activities would be avoided or minimized by the application of stormwater pollution prevention BMPs and the implementation of project-specific SWPPPs. Long-term cumulative impacts to water quality from proposed flight tests and deployment and operational activities would be avoided or minimized by adherence to established water quality permits, water quality regulations, the implementation of the installation's Wastewater Management Plan, Industrial Wastewater Management Plan, Spill Prevention, Control, and Countermeasure Plan, Stormwater Management Plan and all other VSFB standard operating procedures for wastewater discharge and disposal.

4.2 Fort Greely, Alaska

4.2.1 Air Quality and Climate Variability

This analysis estimates the impacts on air quality that would result from the Proposed Action. Air emissions modeling was organized by location and activity type. Site preparations and deployment and operation would occur at FGA. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA, the interceptors would be delivered via air transport. Air emissions modeling was performed for each of the two FGA scenarios, which are summarized as follows:

- FGA Scenario 1: air delivery of the missile transporter
- FGA Scenario 2: ground delivery of the missile transporter

Air emissions from site preparation and deployment and operation were modeled using the DAF ACAM, version 5.0.18a. For the purposes of the analysis, the following timeline assumptions and surrogate years were used: (1) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); (2) deployment and operation at FGA would occur following the construction period, or as early as 2029; and (3) no activities as part of the Proposed Action at FGA would occur past the deployment phase (i.e., no long-term changes in emissions). **Appendix C** contains the ACAM record of air analysis and record of conformity analysis reports for each FGA scenario. **Table 4.2-1** and **Table 4.2-2** for present the estimated annual net change in emissions at FGA from the Proposed Action, under the two scenarios.

Table 4.2-1. Estimated Annual Net Change in Emissions from FGA Scenario 1

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2026 (site preparations)	0.795	4.404	6.124	0.016	2.826	0.152	<0.001	1,652.9
2027 (site preparations)	0.467	2.716	3.903	0.009	1.103	0.085	<0.001	1,050.5
2028 (site preparations)	0.789	2.720	3.908	0.009	1.103	0.085	<0.001	1,052.8
2029 (deployment)	0.356	274.245	3.474	9.028	19.877	17.897	<0.001	27,288.6
2030 and later	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Maximum	**0.795**	**274.245**	**6.124**	**9.028**	**19.877**	**17.897**	**<0.001**	**27,288.6**
PSD threshold	**250**	**250**	**250**	**250**	**250**	**250**	**25**	**NA**
Exceeds threshold?	**No**	**Yes [a]**	**No**	**No**	**No**	**No**	**No**	**NA**

Note: NA = not applicable.
[(a)] *This temporary exceedance is explained in the text below.*

Table 4.2-2. Estimated Annual Net Change in Emissions from FGA Scenario 2

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2026 (site preparations)	0.795	4.404	6.124	0.016	2.826	0.152	<0.001	1,652.9
2027 (site preparations)	0.467	2.716	3.903	0.009	1.103	0.085	<0.001	1,050.5
2028 (site preparations)	0.789	2.720	3.908	0.009	1.103	0.085	<0.001	1,052.8
2029 (deployment)	0.350	269.760	3.423	8.880	19.552	17.604	<0.001	26,846.7
2030 and later	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Maximum	**0.795**	**269.760**	**6.124**	**8.880**	**19.552**	**17.604**	**<0.001**	**26,846.7**
PSD threshold	**250**	**250**	**250**	**250**	**250**	**250**	**25**	**NA**
Exceeds threshold?	**No**	**Yes [a]**	**No**	**No**	**No**	**No**	**No**	**NA**

Note: NA = not applicable.
[(a)] *This temporary exceedance is explained in the text below.*

Effects on air quality are evaluated by comparing the annual net change in emissions for each criteria pollutant against the General Conformity Rule *de minimis* level thresholds for nonattainment and maintenance pollutants and against the PSD threshold, as defined by USEPA, for attainment or unclassified pollutants. The PSD threshold is used as an insignificance indicator that does not denote a significant impact; however, it does provide a threshold to identify actions that have insignificant impacts on air quality. Any action with net emissions below the insignificance indicator for all criteria pollutants is considered so insignificant that the action would not cause or contribute to an exceedance of one or more NAAQS. The Southeast Fairbanks Census Area is in attainment or unclassified for all criteria pollutants; therefore, the General Conformity Rule is not applicable to federal actions occurring in the area. As such, the PSD threshold (250 tpy for all criteria pollutants besides lead, and 25 tpy for lead) was used to determine air quality impact significance.

Estimated annual emissions from the Proposed Action at FGA would exceed the PSD threshold for NO_X. Exceedance would result from C-17 flight operations required to transport 60 NGIs and the missile transporter from Courtland, Alabama, to FGA. However, emissions during the majority of the flight time would occur above the air mixing zone (or above 3,000 feet) and would not contribute to air quality near ground level. These emissions would not factor towards mobile source emissions inventories and would not require inclusion within NAAQS conformity determinations. In addition, the estimated annual emissions from flight operations would occur across a large spatial area and would not result in a high concentration of NO_X emissions in any one county or NAAQS designation area across the flight path. Further, the estimated annual net emissions associated with deployment at FGA under the Proposed Action would exceed the PSD threshold only temporarily. The steady-state (i.e., long-term) annual net emissions would be below the PSD thresholds, resulting in no significant long-term impacts on air quality. Therefore, the Proposed Action would not cause or contribute to an exceedance of one more NAAQS.

CO_2e emissions from site preparations and deployment at FGA were calculated to represent GHG emissions of the Proposed Action. **Table 4.2-3** presents an estimate of the social cost of GHG emissions from existing operations at the MDC at FGA in 2026 (not including the Proposed Action) using the 2023 total diesel fuel usage of the generators at the MDC and the social costs for emissions year 2026 estimated by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG 2021). The social cost of GHG emissions from the Proposed Action between 2024 and 2029, under both scenarios, was then compared to the social cost of GHG emissions from existing actions at FGA (**Table 4.2-4**). Estimated net CO_2e emissions and associated social cost calculations are provided in **Appendix C**.

Table 4.2-3. Estimated Social Costs of GHG Emissions from the MDC at FGA in 2026

Greenhouse Gas	Estimated Total Annual Emissions (metric tons) [a]	2026 Social Cost Rates (in 2020 dollars per metric ton of gas) [b]		Estimated 2026 GHG Social Costs (in 2020 dollars)	
		5% Discount Rate	2.5% Discount Rate	5% Discount Rate	2.5% Discount Rate
Carbon Dioxide (CO_2)	4,502.5	$17.41	$84.26	$78,379.97	$379,369.32
Methane (CH_4)	4.5	$829.06	$2,285.85	$3,747.50	$10,332.42
Nitrous Oxide (N_2O)	10.5	$6,991.27	$30,471.17	$73,500.90	$320,350.78
Total	-	-	-	$155,628.37	$710,052.52

Notes: GHG = greenhouse gas. "-" indicates that no estimate is determined, or not applicable.

(a) Calculated using the default emissions factors for distillate fuel oil no. 2 (for stationary sources; USEPA 2023).

(b) Annual unrounded estimates for the social cost of carbon, methane, and nitrous oxide (OMB 2021).

Table 4.2-4. Estimated GHG Emissions at FGA from the Proposed Action between 2024 and 2029 and Associated Social Cost

Scenario	Total Net CO_2e	Social Cost of GHGs (in 2020 dollars)		Compared to 2026 Social Cost of GHGs for VSFB	
		5% Discount Rate	2.5% Discount Rate	5% Discount Rate	2.5% Discount Rate
FGA Scenario 1	28,163.4	$531,105.79	$1,753,539.33	341%	247%
FGA Scenario 2	27,762.5	$523,475.71	$1,729,026.02	336%	244%

Based on these calculations, the social cost of GHG emissions from site preparations and deployment and operation at FGA from 2024 through 2029 would be estimated to be between approximately $523,476 and $1,753,539, which would represent between approximately 244 and 341 percent of the social cost from existing GHG emissions from the MDC at FGA. The majority of GHG emissions from the Proposed Action at FGA would occur from air transport of the 60 NGIs and missile transporter (FGA Scenario 1 only), which would result in a social cost that is much higher than the existing social cost of GHGs at the MDC. Such GHG emissions would occur only during the deployment phase and would not continue into the future. Long-term NGI operations at FGA would be consistent with ongoing activities; therefore, it was assumed that the social cost of GHG emissions from long-term operations under the Proposed Action would represent a negligible increase in the overall social cost of GHG emissions from FGA.

4.2.1.1 Site Preparations

There is potential for construction activities that would have short-term impacts on air quality at FGA. This includes construction of new facilities and modifications/renovations of Building 663. However, these impacts would be localized and small for each year of construction. The ROI for FGA is in an attainment area, and therefore the General Conformity Rule is not applicable. Estimated emissions from site preparations are shown in **Table 4.2-1** and **Table 4.2-2**. These emissions would not exceed the PSD thresholds; therefore, impacts on air quality from site preparations would not be significant.

4.2.1.2 Deployment and Operation

The MDA expects the NGI to fully integrate with the current GMD system and architecture and integrate with the current fielded GBIs. The proposed NGI would be similar in function to the GBIs. Operational manpower would be consistent with current manpower levels at the MDC. Estimated emissions from air or ground transport required for deployment are shown in **Table 4.2-1** and **Table 4.2-2**. As described in **Section 4.2.1**, emissions of NOx from C-17 flight operations required to deliver the 60 NGIs and missile transporter (FGA Scenario 1 only) would temporarily exceed the PSD threshold of 250 tpy. However, most flight operations would occur above the air mixing zone across a large spatial area and would not cause or contribute to an exceedance of one more NAAQS in any one county or NAAQS designation area across the flight path. Therefore, impacts on air quality from deployment would not be significant.

The new facilities could require the installation of an additional backup generator and modification of the current MDA Title V air permit. At the time of this analysis, detailed generator information was unknown and emissions from generator operation were not modeled. However, emissions from the additional generator are likely to be minimal. Any increases in operational emissions would be well below the PSD threshold of 250 tpy for criteria pollutants. The Proposed Action deployment and operational air quality impacts would be consistent with past NEPA analyses and would not result in a significant impact.

4.2.2 Cultural Resources

There are no known historic properties within the APE for the Proposed Action at FGA. Therefore, the Proposed Action would have no impacts on known historic properties.

Should inadvertent discoveries be made during construction or demolition, the standard operating procedures for inadvertent discoveries of archaeological resources outlined in the installation's ICRMP would be implemented.

4.2.3 Hazardous Materials and Hazardous Waste Management

Hazardous materials would be used or handled during site preparations, transport of the NGI to FGA, and deployment and long-term operations, and. Hazardous materials and waste management would be performed in accordance with ongoing FGA procedures, as well as applicable federal, state, and local regulations.

The volume of hazardous material and waste used or generated as a result of the Proposed Action would be relatively small. With implementation of the BMPs and requirements in the hazardous materials and waste management plans described in **Section 3.2.3**; as well as adherence to applicable federal, state, and local regulations; impacts to the environment are not expected from the presence of potentially hazardous materials and the generation of wastes associated with the Proposed Action.

4.2.3.1 Site Preparations

Site preparation at FGA would include modification of existing silos and Building 663 and may require construction of new buildings as described in **Section 2.1.2.2**. The hazardous materials used for site preparation would be similar to the materials described above for site preparation at VSFB. As described in **Section 3.2.3**, several IRP sites are located near the MDC area. However, they would be avoided during any construction and are not in the areas where new construction would take place.

Building 663 may be modified as part of site preparation, and modifications could encounter lead-based paint, ACM, and paint potentially containing PCBs. Lead-based paint and ACM are not expected to be encountered during silo modifications. All federal, state, and DA regulations with regard to ACM, lead-based paint, or PCB paint would be followed by FGA personnel or contractors, as applicable. ACM surveys would be conducted prior to any modifications to Building 663.

BMPs would be incorporated into design, construction, and repair plans. Such plans may be used during the construction period to minimize the amount of hazardous materials stored, the threat of their accidental and unplanned release into the environment, and the quantity of hazardous waste generated.

Wastes would be segregated as non-hazardous and hazardous, and possibly special wastes for collection and disposal. Non-hazardous waste would be removed for appropriate disposal. Hazardous wastes would be collected for disposal in accordance with applicable federal, state, and DoD requirements. No permitted hazardous waste treatment or disposal facilities exist on FGA; therefore, all hazardous waste would be transferred by licensed hazardous waste transporters for appropriate treatment or disposal. No permitted waste treatment or disposal facilities in Alaska accept PCB paint. Therefore, if PCB paint removal is required during potential Building 663 modifications, the removed paint and any material with PCB paint would be transported to an approved disposal facility in the lower 48 states.

Any spill or discovery of a hazardous material or hazardous waste during construction would be quickly reported, investigated, and remediated in accordance with the Spill Notification and Response component of the FGA Environmental Procedures, the project-specific SWPPP, and the Spill Prevention, Control, and Countermeasure Plan. These procedures would identify the appropriate points of contact for reporting an incident.

4.2.3.2 Deployment and Operation

All NGI shipments to FGA would be by air using military aircraft, and in accordance with applicable DAF, DA, FAA, and DOT regulations. Applicable safety regulations would be followed in the transport, receipt, storage, and handling of hazardous materials, which includes the booster's class 1.3 HTBP solid propellant and the payload propellant. Additionally, storage and handling of all hazardous substances would comply with the Emergency Planning and Community Right-to-Know Act and would follow all installation procedures for reporting.

Hazardous materials used during deployment and operation are similar to those currently used at FGA and would include cleaners, solvents, lubricants, motor fuel, and diesel. These materials would be handled, used, stored, and disposed of by authorized personnel under FGA's hazardous waste management plan.

The NMD Deployment EIS (USASMDC 2000) provided detailed analyses of hazardous materials and wastes used for GBI, which are similar to those that would be associated with NGI deployment and operation at FGA.

4.2.4 Health and Safety

With implementation of the health and safety regulatory requirements and procedures, activities associated with the Proposed Action would pose minimal risk to the health and safety of military personnel, contractors, and the general public.

4.2.4.1 Site Preparations

Site preparation at FGA would include modification of the existing silos and potentially some construction of new buildings and modification to Building 633 as described in **Section 2.1.2.2**. As described in **Section 3.2.3**, several IRP sites are located near the MDC area. However, they would be avoided during any construction and are not in the areas where new construction would take place.

Potential health and safety risks to military personnel and contractors during site preparation activities would be the same as for routine construction and maintenance operations. Because site preparation activities would be confined to the base, there would be no health and safety risk to the public. NGI site preparation activities would be performed in accordance with ongoing FGA procedures described under **Section 3.2.4**, as well as applicable federal, state, and local regulations.

4.2.4.2 Deployment and Operation

All NGI shipments to FGA would be by air using military aircraft, and in accordance with applicable DAF, DA, FAA, and DOT safety regulations.

An appropriate ESQD zone would be established around facilities where NGI AURs and propellant are stored or handled in order to account for the possibility of an unplanned event. Propellant fueling, if conducted at FGA, would follow all applicable health and safety requirements. All ESQD zones would be approved by the DoD Explosives Safety Board.

The primary public and worker safety concerns associated with the NGI during deployment and operation at FGA include mishaps with the interceptors that would lead to an explosion or leak of hypergolic fuels and oxidizers. As described in the NMD Deployment EIS (USASMDC 2000), the potential for an explosion is very small and tests have shown that the interceptor would most likely burn, not explode, during a mishap. The NGI AUR would not contain an explosive warhead. Furthermore, the ESQD zones would fall within the MDC boundary.

An indoor release of liquid propellants could result in localized concentrations that exceed both the Immediately Dangerous to Life or Health or Permissible Exposure Limit for workers (MDA 2018). The most likely areas for an inadvertent release to occur would be within the MAB, ISF, or the missile fields, or during transport to/from the missile fields. Risk from an inadvertent release would be mitigated by design of the existing and any new storage facilities, atmospheric monitoring, protective packaging during transport, and operating procedures that are currently in place at FGA. Applicable safety regulations would be followed in the transport, receipt, storage, and handling of hazardous materials. Storage and handling of all hazardous substances would comply with the Emergency Planning and Community Right-to-Know Act and would follow all installation procedures for reporting.

4.2.5 Noise

Noise impacts from the Proposed Action are expected to be insignificant.

4.2.5.1 Site Preparations

Construction-related noise impacts for the Proposed Action would be similar to those described for site preparation activities previously analyzed at FGA. Refer to **Section 1.8** for prior completed analyses. Short-term, minor to moderate construction-related noise at FGA would be expected during development of the proposed new facilities, potential modification of Building 663, and modification of existing GBI silos. Construction-related noise impacts would be limited to the localized areas on the installation where facility and infrastructure modification or new construction are proposed to occur. Noise would be generated from construction equipment and activities. Noise volume, intensity, and duration would vary with the equipment and tools required for the various updates and may cause annoyance to nearby individuals but would not inhibit ongoing uses of nearby mission facilities or functions, resulting in a finding of insignificance.

No matter the location of construction activities, appropriate noise-attenuating devices, such as vehicle and equipment mufflers, and use of sound barriers would be used to the extent practicable to minimize the temporary noise effects. Operation of construction vehicles and equipment could result in short-term, negligible startle or area avoidance behaviors in wildlife near the on-base facilities that would be modified at FGA. No noise effects on off-installation areas or noise-sensitive receptors would be anticipated.

4.2.5.2 Deployment and Operation

Negligible noise effects from deployment and long-term operation of the NGI at FGA would be expected. These activities combined with the existing mission operations at FGA would not have a significant impact on the overall ambient noise levels at or around the installation.

4.2.6 Socioeconomics and Environmental Justice

The Proposed Action would have short-term, negligible, positive socioeconomic impacts within the ROI. EJ communities were not identified in the FGA ROI, so there would be no disproportionately high and adverse effects to environmental justice populations from the project.

4.2.6.1 Site Preparations

Site preparations at FGA would have short-term, positive socioeconomic impacts on the ROI similar to those described for VSFB in **Section 4.1.8.1** (except that no sales tax revenue would be generated, as there is no state or local sales tax in the ROI). Site preparation activities at FGA are expected to require up to approximately 20 support personnel for a period of several months to a year and a half.

4.2.6.2 Deployment and Operation

Deployment would consist of interstate transportation and emplacement of the NGI at FGA and would have no significant impacts on the socioeconomic factors described for the ROI. Long-term operation of the NGI system would be integrated with the existing GMD systems at FGA and would require no additional staffing.

4.2.6.3 Impacts on EJ Communities

No EJ communities were identified in the FGA ROI, so there would be no disproportionately high and adverse effects to EJ populations from the Proposed Action.

4.2.7 Water Resources

Impacts to water resources at FGA from the Proposed Action would be short-term and negligible.

4.2.7.1 Site Preparations

Construction of the Proposed Action at FGA would be subject to Alaska Pollutant Discharge Elimination System permitting requirements. Potential impacts to water resources resulting from accidental spills of hazardous materials during site preparation would be minimized because all activities would follow the spill prevention, control, cleanup, and emergency response procedures described in **Section 4.1.5**. A construction SWPPP would be submitted to the FGA Directorate of Public Works, Environmental Division, prior to the start of any new construction. The Proposed Action area has relatively level topography. Adherence to the SWPPP and BMPs, along with construction of drainage ditches to control surface water runoff, is expected to minimize the impact to surface water in the area.

Water usage would increase during construction primarily through watering for fugitive dust control. It is not expected that this increase would have an impact on the water supply aquifers at FGA.

4.2.7.2 Deployment and Operation

Transportation, emplacement, and long-term operation and maintenance of the NGI at FGA would not impact water resources. These activities would take place on existing infrastructure and within existing buildings at FGA and would not result in any changes to environmental conditions that would result in impacts.

4.2.8 Cumulative Impacts

The Proposed Action would be implemented in phases. Site preparations, including facility modifications and new construction at FGA, could begin in 2026. Deployment of the NGI to FGA would depend on the outcomes of the flight test campaign. Each resource considered at FGA is analyzed in terms of its ability to accommodate additional effects of the Proposed Action in combination with past, present, or reasonably foreseeable future projects known at this time.

Table 4.2-5 summarizes past, present, and reasonably foreseeable future actions within the vicinity of the FGA project area that could interact with the implementation of the Proposed Action. These projects are based on information presented in the Fort Greely District Area Development Plan (HB&A 2019).

Table 4.2-5. Past, Present, and Future Projects at FGA

Action	Description of Project	Timing
Missile Field 4 (MF4) Construction	Construct an additional 20-silo missile field in support of the MDC, to include silo liners, silo foundations, utilidors, and associated piping.	2019–2025
FGA Communications Center Construction	Construct a communications center to support the Warfighter mission with a redundant capability at the Missile Defense Integration & Operations Center utilizing communications that are separate and independent of the existing Readiness and Control Building. Site work includes the installation of communications duct banks throughout the MDC that interface with the missile fields and Readiness and Control Building.	2021–2025
Missile Field 1 (MF1) Expansion	Construct MF1 expansion to include completing an additional two GBI launch facilities and supporting utilities infrastructure.	2022–2025
Modifications to Building 656	Fully renovate existing building, including repair or replacement of interior finishes, plumbing, heating, and electrical systems. Exterior work includes grade and patch of disturbed asphalt at demolished and new entry, repair and compacting of subgrade, and striping of parking spaces.	2024–2025
Modifications to Building 658	Upgrade mechanical heating and cooling systems and bathrooms; update electrical interior distribution and devices; add new lightning protection system, fire suppression system, fire sprinkler riser room, telecommunications room, and exterior insulation and finish system; replace window and blank panels; and refinish mezzanine office.	2024
Construct Off-road Vehicle (ORV) Recreation Area	Construct parking, roads, support buildings, and shelters for an ORV recreation area located north of the cantonment area.	2024- 2029
Renovate Aircraft Parking	Renovate aircraft parking area, including 34,500 square yards of new construction.	2024–2029
Upgrades to Bison Trail, West Post Road, and East Post Road	Pave and enhance Bison Trail, including installing new gazebos and benches. Pave West Post Road and East Post Road to improve connectivity.	2024–2029
Construct Warm Storage	Construct climate-controlled storage and pavement.	2024–2029
Refurbish Sports Field	Refurbish two sports fields.	2024–2029
Building 662 renovation	Renovate barracks to create common area.	2024–2029
Construct Secondary Access Control Point (ACP)	Construct a secondary ACP on Boundary Road, including administration, visitor center, sentry building, gatehouse, and guard booths.	2024–2029

Action	Description of Project	Timing
Maintenance Support Facility (MSF) Construction	Construct an approximately 60,000-square-foot MSF, located on the MDC, to provide a warehouse, maintenance shops, management support areas, building maintenance/support areas (e.g., janitorial), and warm vehicle storage space. Includes an above-ground storage tank for fuel and a vehicle fueling station. The MSF will allow recurring maintenance for the weapons system and quick response to mission essential weapons system failures.	2026–2027
Construct Wash Rack	Construct wash facility and pavement.	2024–2039
Relocate RV Campground and Renovate Skeet Range	Relocate the RV campground from Robin Road to the Skeet Range. Renovate Skeet Range buildings and construct an addition.	2024–2029
Consolidate LRC and Demolish Buildings 508, 509, and 511	Consolidate LRC (logistics) into a central hub to be located at the airfield. Includes maintenance/service facility, warehouse, administration facilities, and parking.	2024–2039
Improve Building 601	Renovate Building 601 for retail to expand retail services.	2024–2039
Construct 49th GMD Security Logistics Operations Center	Consolidate the 49th Battalion closer to the MDA entry gate for quick response. Construct administration building, parking, and sidewalks.	2024–2039

4.2.8.1 Air Quality

Construction activities from the Proposed Action at FGA would produce minor amounts of fugitive dust emission (PM_{10}/$PM_{2.5}$) and emissions due to the use of fuel-powered equipment. The minor levels of emissions from the proposed construction activities in combination with emissions from existing and future cumulative projects would not exceed NAAQS, and cumulative impacts to air quality would not be significant.

4.2.8.2 Cultural Resources

The Proposed Action would have no impacts on known historic properties at FGA. Should inadvertent discoveries be made during construction or demolition associated with the Proposed Action or other projects described in **Table 4.2-5**, the installation's ICRMP would be implemented. Consequently, no significant cumulative impacts to cultural resources are anticipated from the Proposed Action.

Further coordination with the Alaska SHPO would be required prior to any future activities that occur in proximity to cultural resources.

4.2.8.3 Hazardous Materials and Hazardous Waste

The Proposed Action at FGA would result in a negligible increase in use of hazardous materials and generation of hazardous waste at the installation. Any hazardous material and waste associated with the Proposed Action and other projects listed in **Table 4.2-5** would be properly managed in accordance with federal, state, and local regulations. Therefore, no significant cumulative impacts from the management of hazardous materials and waste are anticipated.

4.2.8.4 Health and Safety

With implementation of the health and safety regulatory requirements and procedures, activities associated with the Proposed Action would pose minimal risk to the health and safety of military personnel, contractors, and the general public. No adverse cumulative impacts on health and safety would be expected from the Proposed Action when combined with other projects at FGA.

4.2.8.5 Noise

Noise from construction activities associated with the Proposed Action would have a cumulative effect when combined with other construction projects in **Table 4.2-5** that occur at the same time. However, the noise producing activities would generally be spread out both in geographic area and in time. Therefore, cumulative impacts from noise would not be significant.

4.2.8.6 Socioeconomics and Environmental Justice

Site preparations at FGA would have short-term, negligible, positive socioeconomic impacts in the area due to the temporary presence of construction workers and additional support personnel. This benefit could have a cumulative effect when combined with other construction projects in **Table 4.2-5**, resulting in more job opportunities and experience for the workforce within the ROI. These impacts would be localized and limited to the region surrounding the installation, and therefore beneficial cumulative effects would be minor.

Deployment of the NGI would not impact socioeconomic factors. Because the Proposed Action would not require permanent additional staff at FGA, it would not contribute to adverse cumulative impacts on housing availability in the municipalities surrounding FGA.

4.2.8.7 Water Resources

Impacts to water resources at FGA from the Proposed Action would be short-term and negligible. For the Proposed Action and the other projects described in **Table 4.2-5**, SWPPPs and BMPs would be implemented to minimize the impacts to surface water. Therefore, no significant cumulative impacts on water resources are anticipated.

4.3 Broad Ocean Area

4.3.1 Biological Resources

Biological resources in the BOA could be exposed to elevated sound pressure levels from sonic booms or component splashdown (both in-air and underwater), direct contact from debris, and exposure to hazardous chemicals. Environmental analyses for a number of other missile system flight tests within open ocean areas of the Pacific Ocean have been conducted, and generally concluded that there would be no significant impacts to biological resources in the BOA (DAF 1997, DAF 2002, DAF 2013, DAF 2020, MDA 2007c, MDA 2017, MDA 2021, USASMDC 2001, USASMDC 2003, USASMDC and Teledyne Brown Engineering, Inc. 2019, U.S. Department of the Navy 1998, U.S. Navy 2017, U.S. Navy 2019). Furthermore, these analyses have indicated that adverse effects to special status species and/or sensitive habitats in the BOA are unlikely for these types of flight tests. The potential NGI flight test scenario is fundamentally similar to these previously considered actions, as well as to ongoing missile launches from VSFB that overfly the BOA of the Pacific Ocean.

The Proposed Action would not significantly impact biological resources in the BOA. While some common marine wildlife might be exposed to loud sounds, proposed activities would not change species abundance or distribution in the ROI. Marine wildlife would have the potential to be impacted by direct contact and hazardous chemicals from debris in deep water impact zones. While there is a chance that marine mammals and sea turtles near the surface might be struck by debris, the chances are very low as the density of marine species, including marine mammals, generally decreases and the corresponding probability of impact decreases, as the distance from shore increases. Booster drop zones, debris impact areas, and terminal hazard areas for the NGI flight tests are expected to be in the open ocean far from shore. The likelihood of injury to any marine mammal from direct impact or shock wave impact from missile debris has been estimated to be extremely remote to nonexistent (USASMDC/ARSTRAT 2013, USASMDC and Teledyne Brown Engineering, Inc. 2019). The BMDS Programmatic EIS (MDA 2007c) quantified this likelihood to be less than 0.0006 marine mammals exposed per year (i.e., less than six marine mammals exposed per 10,000 years). The Pacific Spaceport Complex Alaska Missile Defense System Flight Test Support Supplemental EA (MDA 2021) analyzed potential impacts to marine mammal populations near Kodiak Alaska, where population densities are higher than in the BOA ROI, and concluded that the probability of an individual marine mammal being hit by a single piece of flight termination or intercept debris is on the order of less than 1 in 4,700 during a test flight. Due to these extremely low likelihoods of being struck by a piece of flight test debris, no effects to ESA-listed species in the BOA are expected and no take or harassment of MMPA-protected species is expected as a result of the Proposed Action.

Effects from exposure to hazardous chemicals are not expected in deep water impact zones. All components would sink to the ocean floor where they would not be a risk to wildlife. Small quantities of hazardous chemicals such as residual fuels may enter the water but would be rapidly diluted by the large volume of ocean water. Materials released during impact are not expected to be present in sufficient quantities or concentrations to adversely affect any sensitive or special-status wildlife.

No special-status marine wildlife is expected to be adversely affected by proposed activities. Special-status marine wildlife might be startled by elevated noise levels in the BOA, but no injury or long-term effects are expected. The Proposed Action is not expected to have adverse effects on protected habitats (i.e., designated critical habitat, essential fish habitat, or other marine protected areas) and impacts on marine biological resources would be less than significant.

4.3.2 Cumulative Impacts

Other flight test activity would continue to occur in the BOA in addition to the Proposed Action. Seven to nine GBSD and Minuteman III flight tests are currently projected for each year from 2024 through 2029 (DAF 2021), although GBI flight tests would conclude prior to the commencement of NGI flight tests. The impacts on biological resources in the BOA for currently projected flight tests would be similar to those described above for the Proposed Action, which would contribute up to three flights per year. As GBI and NGI flight tests would not occur concurrently, the number of missile flight tests occurring annually from VSFB would decrease under the Proposed Action. Impacts on other resources would be negligible. The cumulative impacts on the BOA from the Proposed Action combined with other test launch activity would not be significant.

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Appendix A: Consultation and Agency Correspondence and Notified Parties

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Federal Agencies

Bureau of Indian Affairs, Alaska Region
Bureau of Land Management:
- Fairbanks District
- California Desert District
- California Central District

Federal Aviation Administration:
- Alaskan Region Headquarters
- Fairbanks Flight Standards District Office

National Marine Fisheries Service:
- West Coast Region
- Southwest Region

National Oceanic and Atmospheric Administration, Channel Islands National Marine Sanctuary
National Park Service, Channel Islands National Park
United States Army Corps of Engineers:
- Fairbanks Field Office
- Los Angeles District
- North Coast Branch/Ventura Field Office

United States Coast Guard, Eleventh Coast Guard District
United States Environmental Protection Agency:
- District 9
- District 10

United States Fish and Wildlife Service:
- Northern Alaska Fish and Wildlife Field Office
- Ventura Fish and Wildlife Office

State Agencies

Alaska Department of Environmental Conservation
Alaska Department of Fish and Game
Alaska Department of Natural Resources
Alaska Department of Transportation and Public Facilities, Northern Region
Alaska Office of History and Archaeology/State Historic Preservation Office
[California] Central Coast Regional Water Quality Control Board
California Coast Regional Water Quality Control Board
California Coastal Commission
California Department of Fish and Wildlife, South Coast Region
California Office of Historic Preservation, Archaeology and Environmental Compliance Unit
California Natural Resources Agency
Santa Barbara County Air Pollution Control District

State and Local Public Officials

City of Delta Junction
City of Lompoc
City of Santa Maria
Santa Barbara County Board of Supervisors

Consulted Tribes

Dot Lake Village Council, Fairbanks, Alaska
Healy Lake Village Council, Fairbanks, Alaska
Mentasta Traditional Council, Mentasta, Alaska
Native Village of Eagle, Eagle, Alaska
Native Village of Tanacross (IRA), Tanacross, Alaska
Native Village of Tetlin (IRA), Tok, Alaska
Nenana Traditional Council, Nenana, Alaska
Northway Traditional Council, Northway, Alaska

Community Groups

California Native Plant Society
California Trout
Environmental Defense Center
Gaviota Coast Conservancy
La Purisima Audubon Society
Santa Barbara Museum of Natural History
Sierra Club, Los Padres Chapter

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DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Tracy Charles-Smith
Native Village of Dot Lake Council
P.O. Box 70488
Fairbanks, AK 99707

Dear President Smith:

The Department of Defense's (DoD) Missile Defense Agency (MDA), in cooperation with the U.S. Army Garrison, Fort Greely, Alaska (FGA), is preparing a Next Generation Interceptor (NGI) Programmatic Environmental Assessment (PEA) to consider the potential environmental impacts from the proposed construction and operation of NGI missile defense assets at FGA (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1).

The NGI would be an advanced interceptor (missile) fully capable of integration into the current MDA Ground-Based Midcourse Defense (GMD) system, located at FGA. The NGI is intended to update and enhance the current fielded Ground-based Interceptors (GBIs). The proposed NGI would be similar in function to the GBIs and would utilize the existing GBI silos. As with the GBI, the NGI's function would be to intercept incoming ballistic missile warheads outside the Earth's atmosphere and destroy them by force of impact. No nuclear or conventional explosive warheads would be used. No interceptor flight tests would be conducted at FGA.

The NGI PEA evaluates the potential environmental impacts from construction and operation of the following:

- Use of existing MDA Missile Defense Complex (MDC) facilities and silos
- Potential construction of a Missile Assembly Building, Interceptor Storage Facilities, and new hazardous materials storage buildings on the MDC
- Potential modification to FGA Building 663 for additional administrative space
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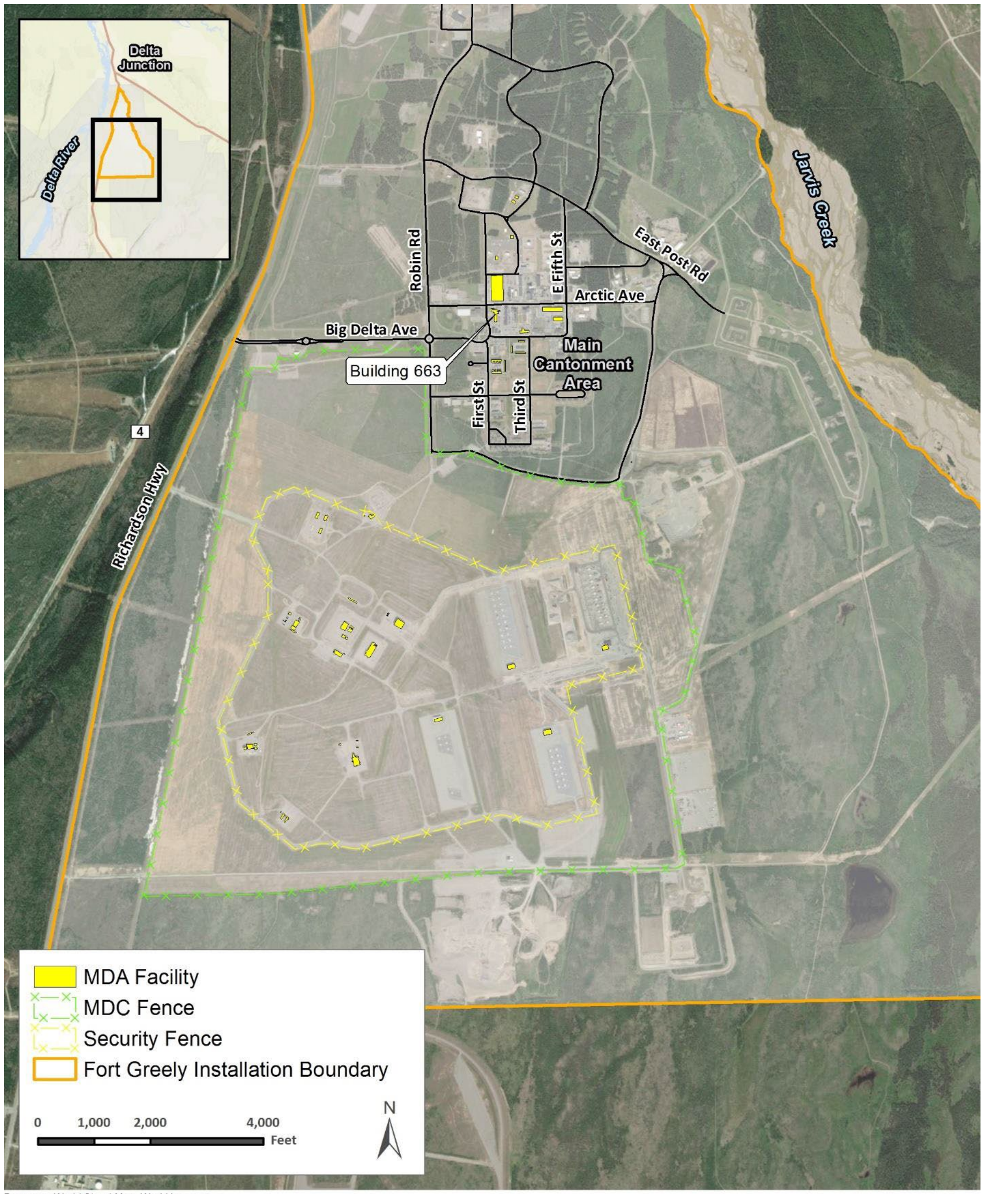

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Missile Defense Agency
MDA/MSRN
Attention: Mr. Jamey Elliott
5222 Martin Road
Redstone Arsenal, AL 35898

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If you would like to confer with senior leadership or have any questions about this project, please contact Mr. Jamey Elliott.

Sincerely,

CROSBY.BUFF.LEA.1398914232 Digitally signed by CROSBY.BUFF.LEA.1398914232 Date: 2023.12.18 09:50:40 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Karma Ulvi
Native Village of Eagle
P.O. Box 19
Eagle, AK 99738

Dear First Chief Ulvi:

The Department of Defense's (DoD) Missile Defense Agency (MDA), in cooperation with the U.S. Army Garrison, Fort Greely, Alaska (FGA), is preparing a Next Generation Interceptor (NGI) Programmatic Environmental Assessment (PEA) to consider the potential environmental impacts from the proposed construction and operation of NGI missile defense assets at FGA (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1).

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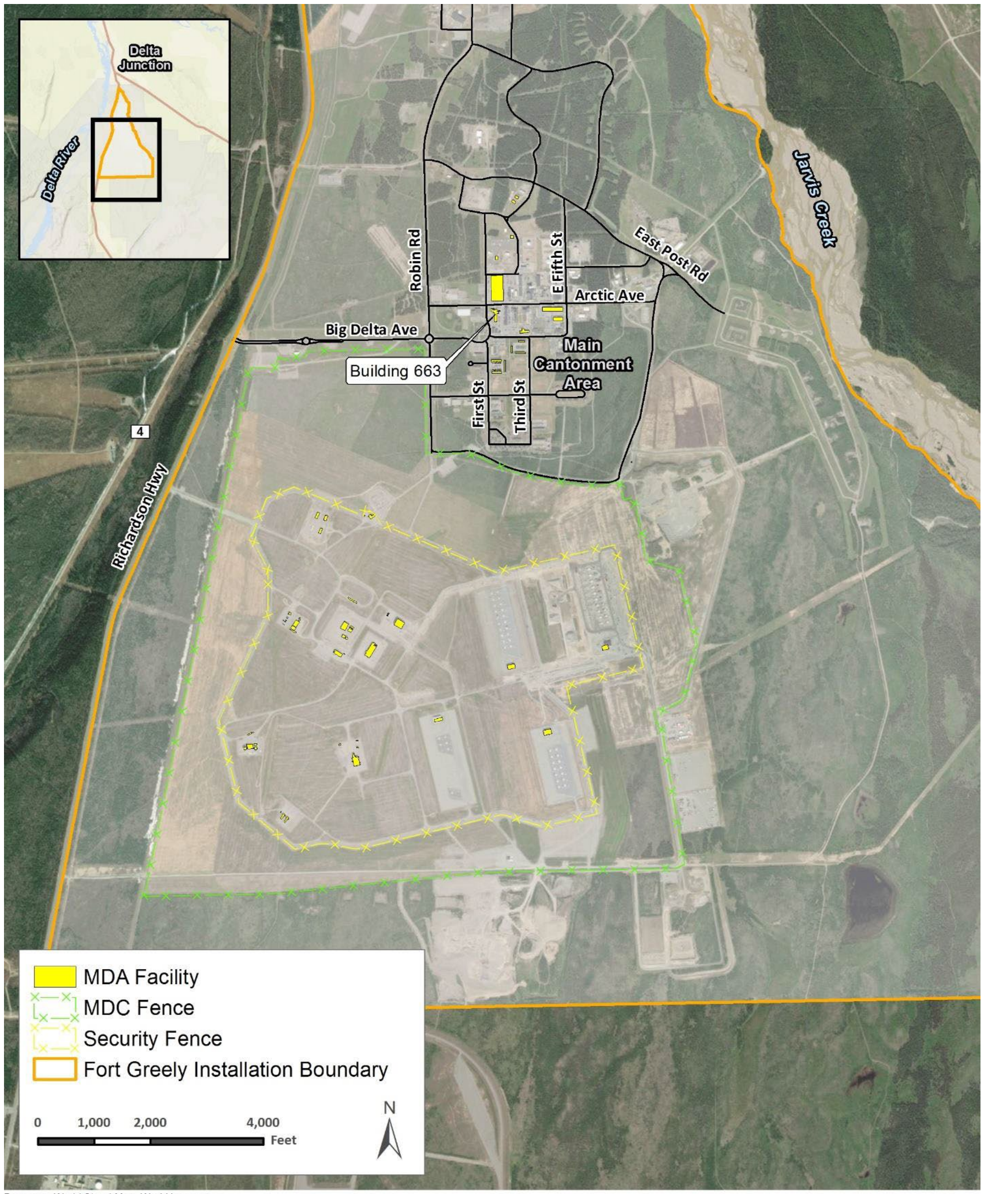

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MDA/MSRN
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LEA.1398914232
Digitally signed by
CROSBY.BUFF.LEA.1398914232
Date: 2023.12.18 09:49:58 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Patricia MacDonald
Healy Lake Village Council
600 University Avenue, Suite 100
Fairbanks, AK 99709

Dear President MacDonald:

The Department of Defense's (DoD) Missile Defense Agency (MDA), in cooperation with the U.S. Army Garrison, Fort Greely, Alaska (FGA), is preparing a Next Generation Interceptor (NGI) Programmatic Environmental Assessment (PEA) to consider the potential environmental impacts from the proposed construction and operation of NGI missile defense assets at FGA (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1).

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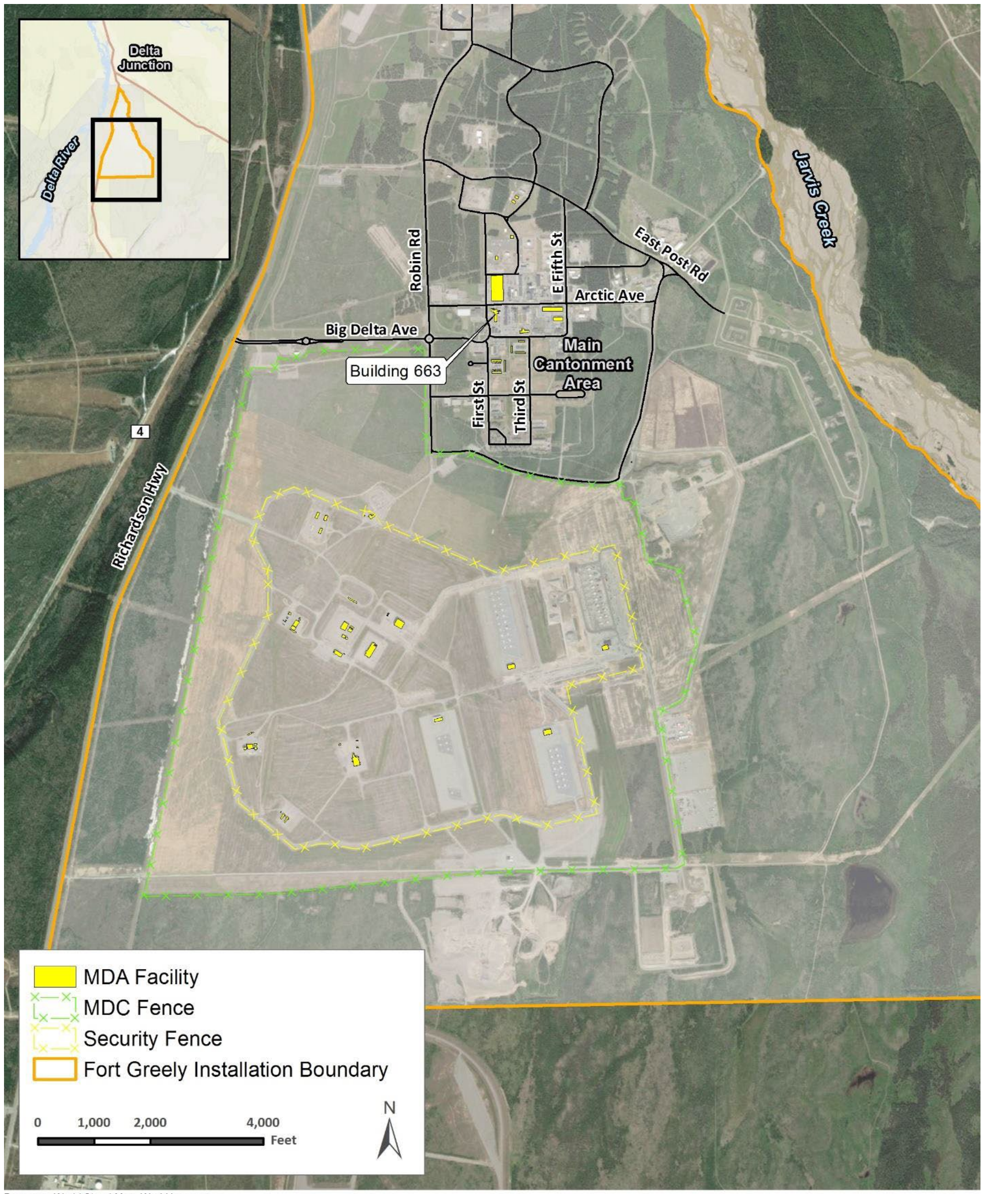

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Date: 2023.12.18 09:49:12 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Emmanuel Baker
Mentasta Traditional Council
P.O. Box 6019
Mentasta, AK 99780-6019

Dear First Chief Baker:

The Department of Defense's (DoD) Missile Defense Agency (MDA), in cooperation with the U.S. Army Garrison, Fort Greely, Alaska (FGA), is preparing a Next Generation Interceptor (NGI) Programmatic Environmental Assessment (PEA) to consider the potential environmental impacts from the proposed construction and operation of NGI missile defense assets at FGA (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1).

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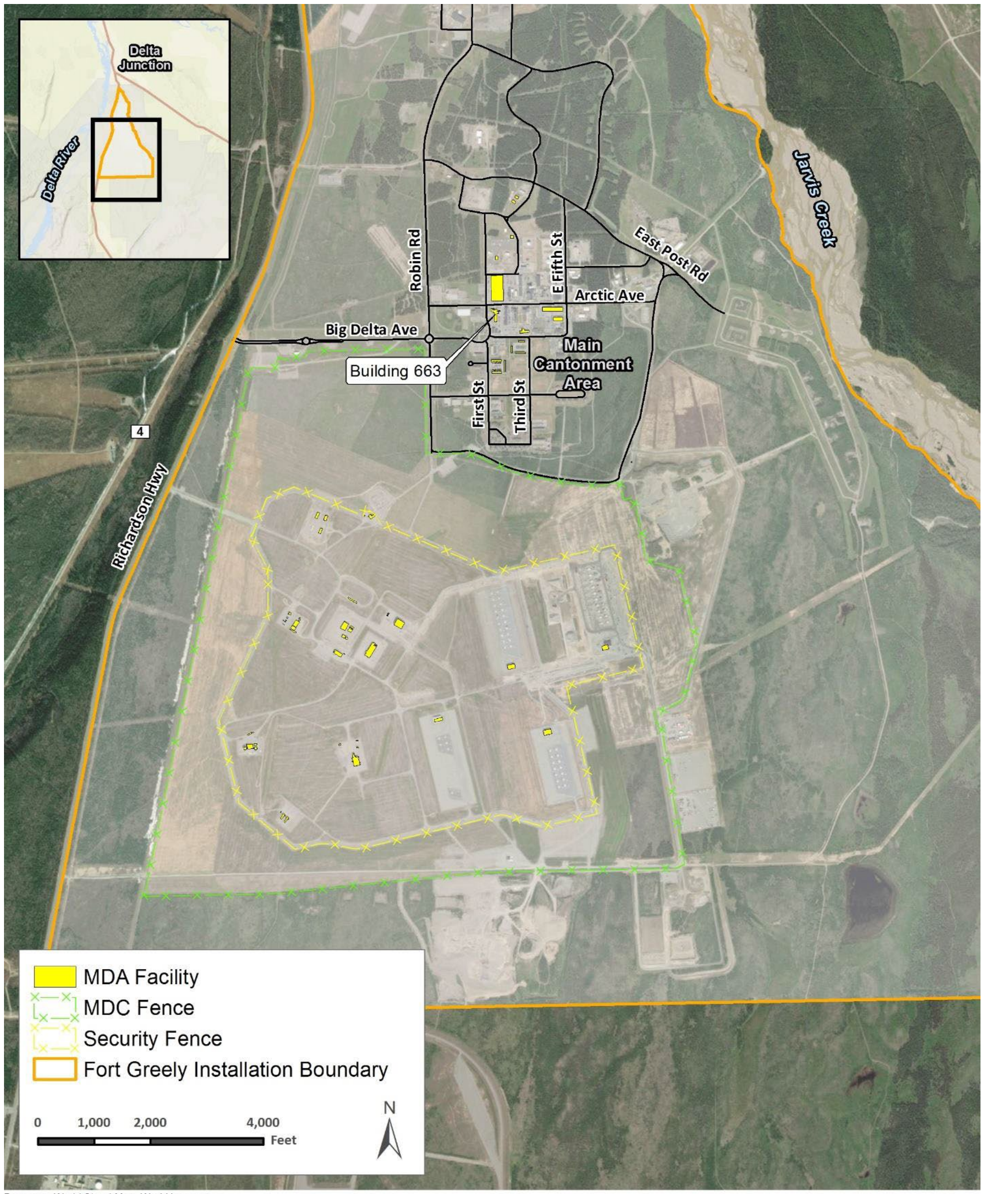

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BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Caroline Ketzler
Nenana Native Village Council
P.O. Box 369
Nenana, AK 99760

Dear First Chief Ketzler:

The Department of Defense's (DoD) Missile Defense Agency (MDA), in cooperation with the U.S. Army Garrison, Fort Greely, Alaska (FGA), is preparing a Next Generation Interceptor (NGI) Programmatic Environmental Assessment (PEA) to consider the potential environmental impacts from the proposed construction and operation of NGI missile defense assets at FGA (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1).

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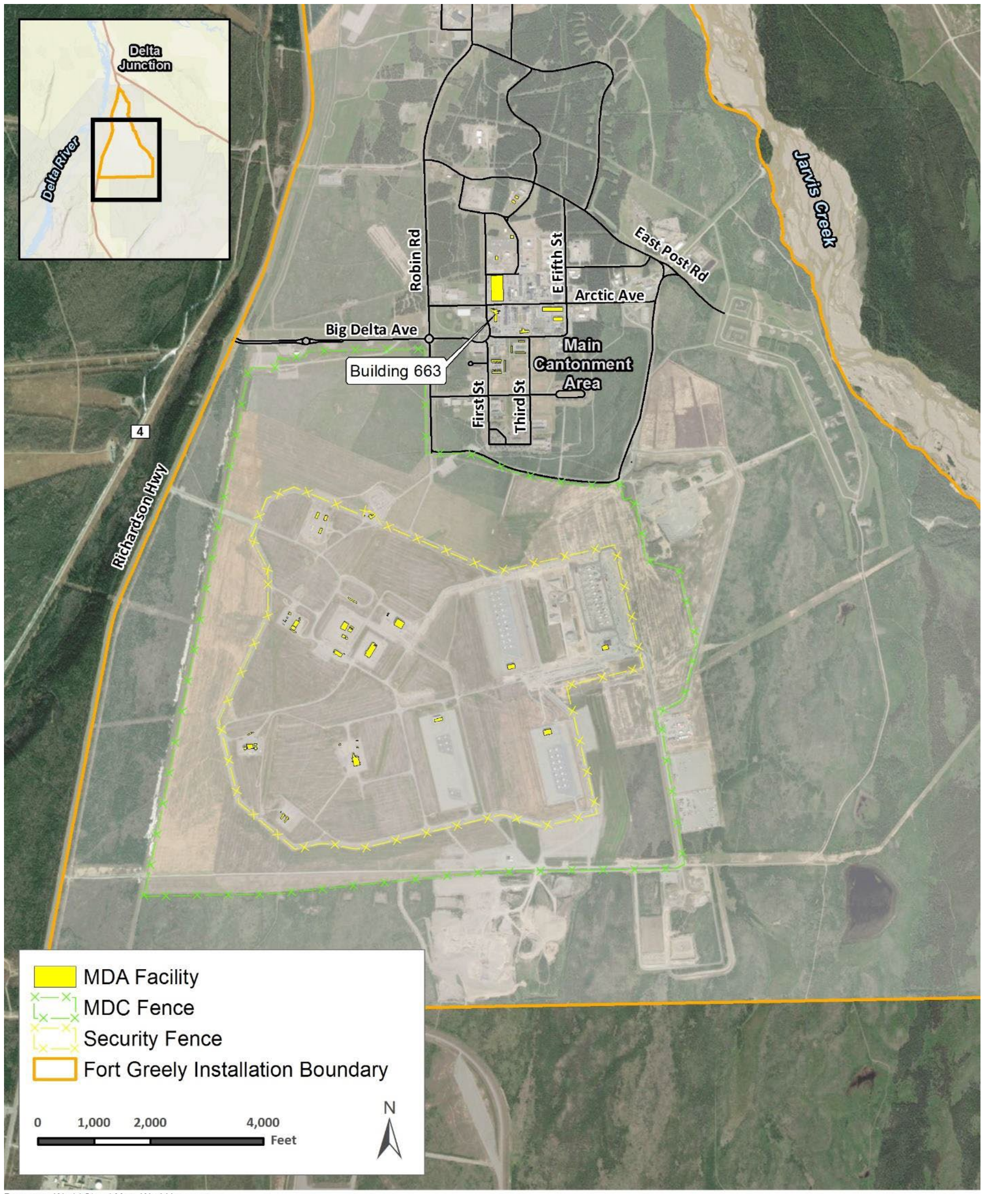

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Date: 2023.12.18 09:46:36 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Chaaiy Albert
Northway Traditional Council
P.O. Box 516
Northway, AK 99764

Dear President Albert:

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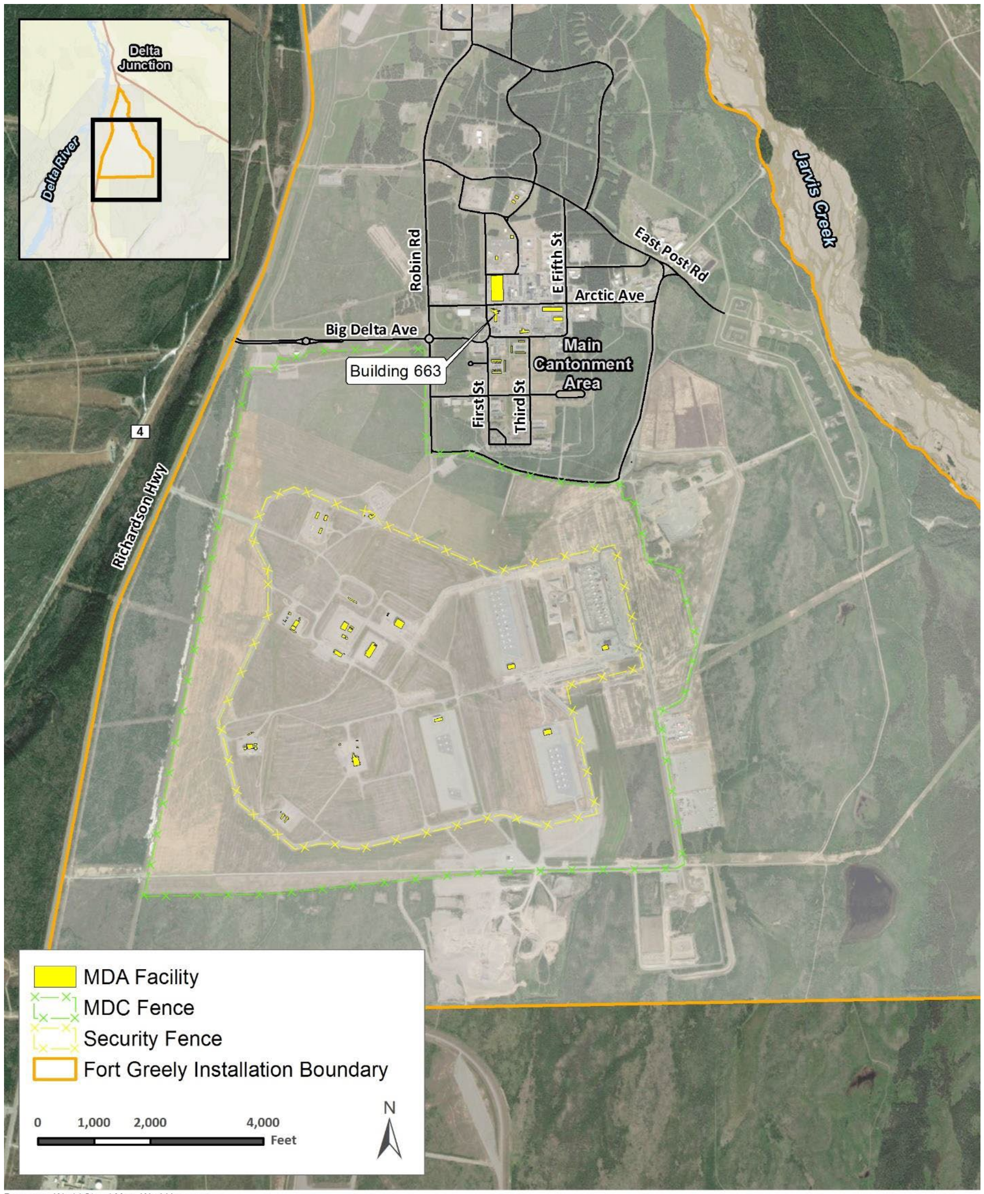

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This letter and information are provided so that you can schedule a meeting, if desired, about the action during the PEA's 30-day comment period.

Even if your tribal government does not require consultation, we welcome any comments you may have on the proposed action. Please send your requests for consultation or your written comments via e-mail (preferred) to Mr. Jamey Elliott, MDA Environmental Officer, at james.elliott@mda.mil or by regular mail to:

Missile Defense Agency
MDA/MSRN
Attention: Mr. Jamey Elliott
5222 Martin Road
Redstone Arsenal, AL 35898

Comments must be received by the end of the PEA comment period, to ensure they are considered and become a part of the official record. This date will be provided on the MDA website when the PEA is released for public review. No comments received will indicate your concurrence with the Proposed Action.

If you would like to confer with senior leadership or have any questions about this project, please contact Mr. Jamey Elliott.

Sincerely,

CROSBY.BUFF.LEA.1398914232 Digitally signed by CROSBY.BUFF.LEA.1398914232 Date: 2023.12.18 09:45:51 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Ms. Judith Bittner
State Historic Preservation Officer
Office of History and Archaeology
550 West 7th Avenue, Suite 1310
Anchorage, AK 99501-3565

Dear Ms. Bittner:

The Department of Defense's Missile Defense Agency (MDA) is proposing to construct and operate Next Generation Interceptor (NGI) missile defense assets at Fort Greely, Alaska (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1). In compliance with Section 106 of the National Historic Preservation Act of 1966 [36 CFR § 800.2(a)(4)], the purpose of this letter is to notify you of a Federal undertaking and to seek your concurrence on an assessment of effect.

The NGI would be an advanced interceptor (missile) fully capable of integration into the current MDA Ground-Based Midcourse Defense (GMD) system, located at FGA. The NGI is intended to update and enhance the current fielded Ground-based Interceptors (GBIs). The proposed NGI would be similar in function to the GBIs and would utilize the existing GBI silos.

The MDA, in cooperation with U.S. Army Garrison, Fort Greely (FGA) is preparing a Programmatic Environmental Assessment (PEA) to evaluate the potential environmental impacts from construction and operation of the following:

- Use of existing MDA Missile Defense Complex (MDC) facilities and silos
- Potential construction of a Missile Assembly Building, Interceptor Storage Facilities, and new hazardous materials storage buildings on the MDC
- Potential modification to FGA Building 663 for additional administrative space
- Minor internal silo modification and potential reinforcement to the ground area surrounding the existing GMD silos.

Construction activities could begin in 2026. Figure 2 shows the Proposed Action location. An area of potential effects (APE) for the Proposed Action was delineated pursuant to 36 Code of Federal Regulations (CFR) 800.4(a)(1). The APE at FGA is defined as the footprint of buildings and structures identified for modification, including the ground area surrounding the silos. The APE also includes areas identified for new construction on the MDC.

There are no Historic-age cultural resources identified for use in the APE at FGA. Building survey work on Fort Greely began in 1997. At that time, 26 Cold War-era buildings on Fort Greely were determined to be eligible for the National Register of Historic Places (NRHP) and a district was created. In response to the realignment of Fort Greely, the installation and the AK State Historic Preservation Office (SHPO) entered into a MOA in 1999 concerning these buildings and the Army agreed to mitigate any impacts to these structures by preparing a Historic

American Buildings Survey (HABS). With completion of the HABS recordation, the MOA allowed the Army to transfer, remodel, rehabilitate, or demolish any of these buildings without SHPO consultation. In 2021, the AK SHPO concurred that the district would no longer be eligible for the NRHP following the demolition of Building 606 and 607, as these were the last mission related contributing properties in the historic district. Building 663, which is in the cantonment area and may require modification, is not considered Historic.

Figure 1. Location of Project Area in Red

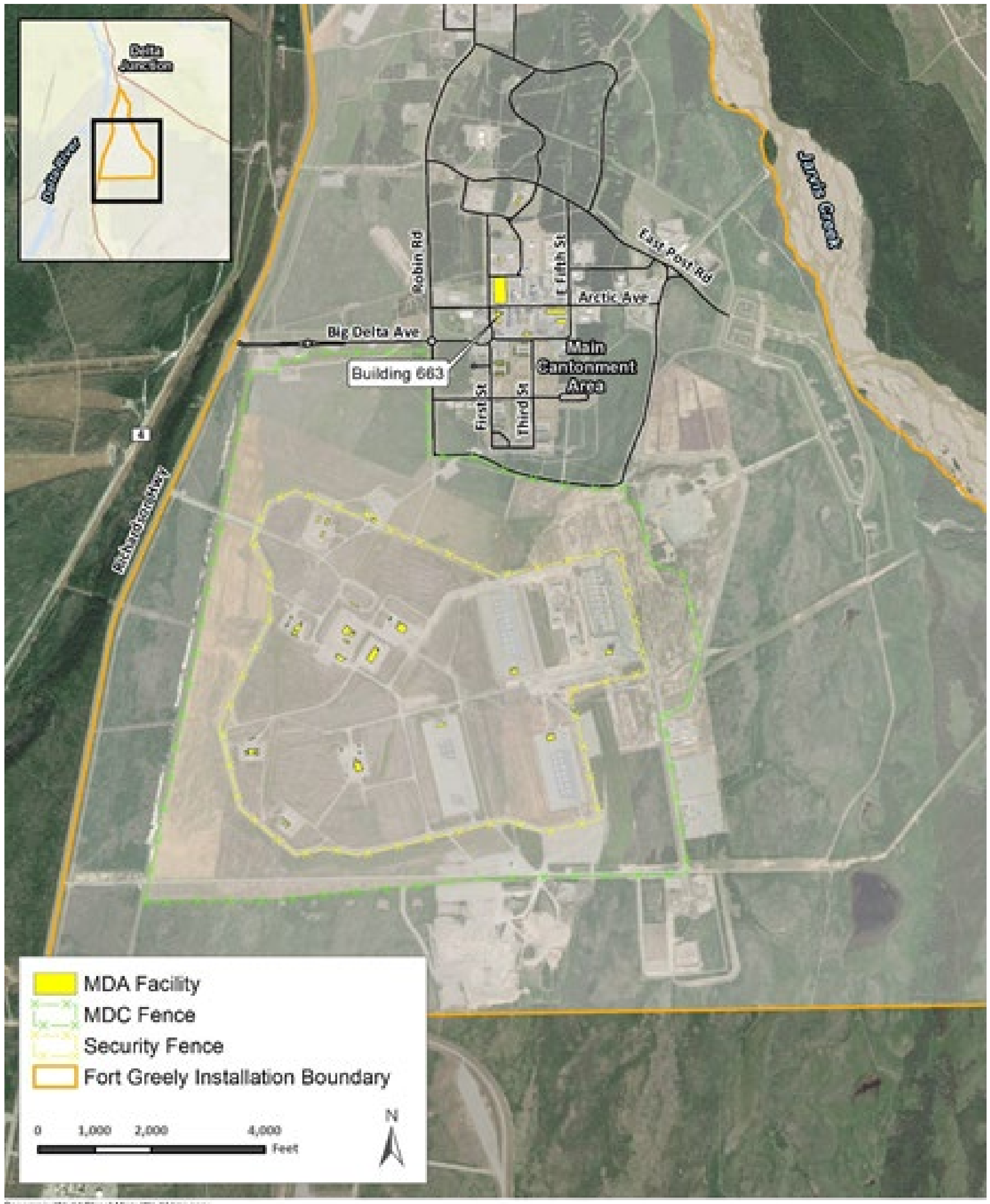

Figure 2. Proposed Action

In compliance with Sections 106 and 110 of the National Historic Preservation Act, FGA has undertaken a number of historic property identification and evaluation efforts. The MDC area was previously surveyed for archaeological resources; no cultural resources were encountered in the area and the likelihood of encountering archaeological resources in the area is considered very low. Within the boundaries of FGA, 16 archaeological sites have been identified. Nine of the sites have been found not eligible and seven of the sites have been found eligible for the NRHP. No archaeological sites have been identified within or near the APE.

The MDA determined that no historic properties will be affected by the proposed undertaking. Following 36 CFR § 800.5(b), we seek your concurrence on the determination that the proposed NGI activities at FGA will result in no adverse effects on historic properties.

If you have any questions about this project, please contact Jamey Elliott, MDA Environmental Officer, at (256) 450-5429 or email at james.elliott@mda.mil.

Sincerely,

CROSBY.BUFF.LEA.1398914232 Digitally signed by CROSBY.BUFF.LEA.1398914232 Date: 2023.12.18 09:51:29 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Herbert Demit
Native Village of Tanacross
P.O. Box 76009
Tanacross, AK 99776

Dear President Demit:

The Department of Defense's (DoD) Missile Defense Agency (MDA), in cooperation with the U.S. Army Garrison, Fort Greely, Alaska (FGA), is preparing a Next Generation Interceptor (NGI) Programmatic Environmental Assessment (PEA) to consider the potential environmental impacts from the proposed construction and operation of NGI missile defense assets at FGA (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1).

The NGI would be an advanced interceptor (missile) fully capable of integration into the current MDA Ground-Based Midcourse Defense (GMD) system, located at FGA. The NGI is intended to update and enhance the current fielded Ground-based Interceptors (GBIs). The proposed NGI would be similar in function to the GBIs and would utilize the existing GBI silos. As with the GBI, the NGI's function would be to intercept incoming ballistic missile warheads outside the Earth's atmosphere and destroy them by force of impact. No nuclear or conventional explosive warheads would be used. No interceptor flight tests would be conducted at FGA.

The NGI PEA evaluates the potential environmental impacts from construction and operation of the following:

- Use of existing MDA Missile Defense Complex (MDC) facilities and silos
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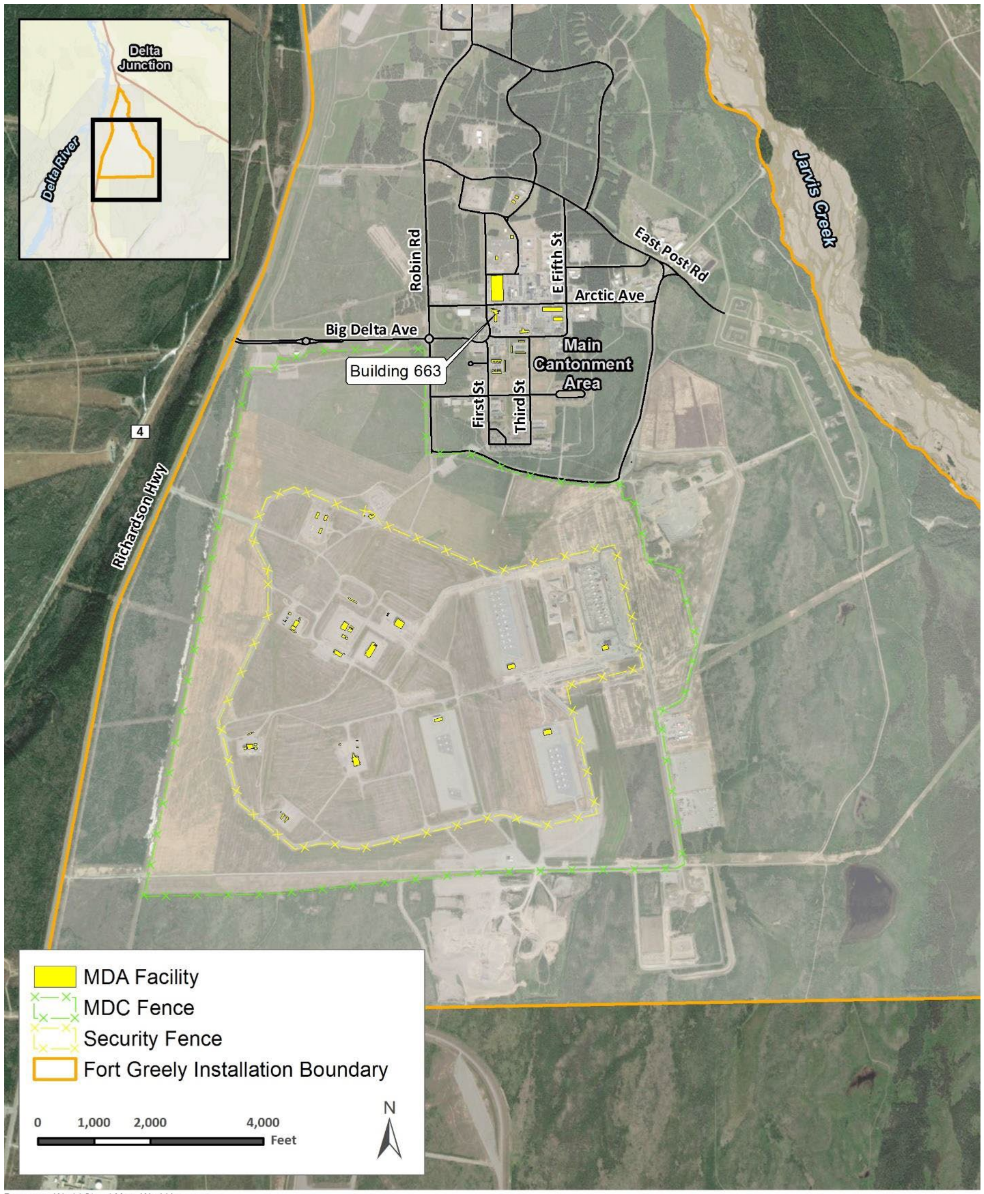

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If you feel that the Proposed Action affects your citizenry's protected tribal rights, resources, or interests we invite you to consult in accordance with 36 CFR 800.2, Executive Order 13175: Consultation and Coordination with Indian Tribal Governments, and the DoD Native American and Alaska Native Policy. The Proposed Final PEA is anticipated to be

available on the MDA website in January 2024 and a hard copy will be available for review at the following locations:

- Delta Community Library, Delta Junction, AK
- Fairbanks North Star Borough Public Library, Fairbanks, AK
- Noel Wien Library, Fairbanks, AK

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Date: 2023.12.18 09:45:05 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

December 18, 2023

Michael Sam
Native Village of Tetlin
P.O. Box 797
Tok, AK 99780

Dear President Sam:

The Department of Defense's (DoD) Missile Defense Agency (MDA), in cooperation with the U.S. Army Garrison, Fort Greely, Alaska (FGA), is preparing a Next Generation Interceptor (NGI) Programmatic Environmental Assessment (PEA) to consider the potential environmental impacts from the proposed construction and operation of NGI missile defense assets at FGA (Section 14, T11S, R10E, USGS Quad Big Delta A-4, Fairbanks Meridian; Figure 1).

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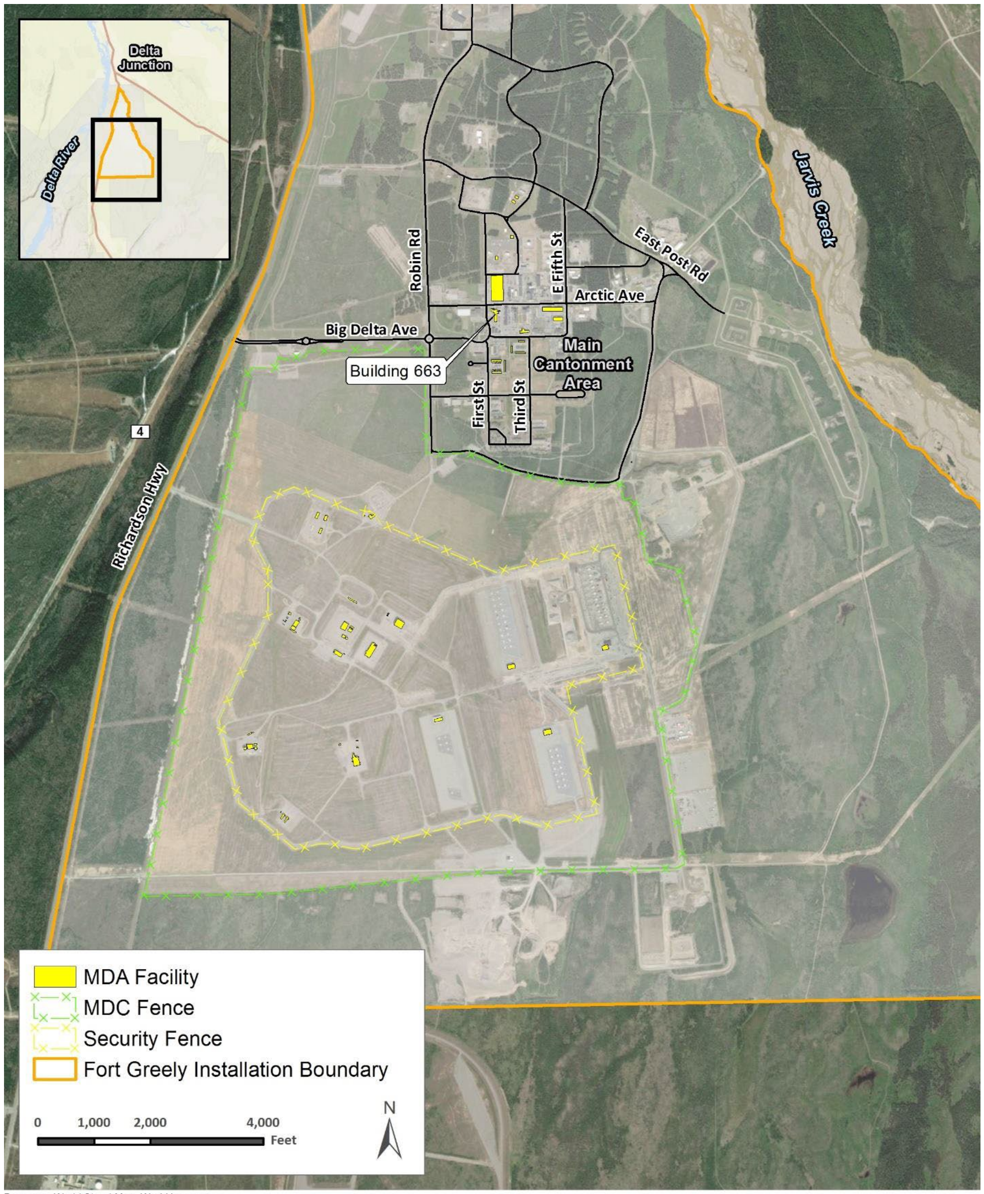

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Missile Defense Agency
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If you would like to confer with senior leadership or have any questions about this project, please contact Mr. Jamey Elliott.

Sincerely,

CROSBY.BUFF.LEA.1398914232 Digitally signed by CROSBY.BUFF.LEA.1398914232 Date: 2023.12.18 09:44:07 -06'00'

BUFF L. CROSBY, Ph.D.
Director, Environmental Management
Real Property Investments and Deployments

DEPARTMENT OF THE AIR FORCE
UNITED STATES SPACE FORCE
SPACE LAUNCH DELTA 30

1 April 2024

Beatrice L. Kephart
30 CES/CEI
1028 Iceland Avenue
Vandenberg SFB, CA 93437-6919

Mr. Cassidy Teufel
Federal Consistency Coordinator
Energy, Ocean Resources and Federal Consistency
California Coastal Commission
455 Market Street, Suite 228
San Francisco, CA 94105-2219

Dear Mr. Teufel,

In accordance with the Federal Coastal Zone Management Act of 1972, as amended (CZMA), Section 307c(1), and 15 Code of Federal Regulations (CFR) Part 930, the Department of the Air Force (DAF) has determined that the development and testing of a Next Generation Interceptor (NGI; i.e., the Proposed Action, or Project) at Vandenberg Space Force Base (VSFB) would not adversely affect coastal uses or resources because measures would be taken to prevent or minimize impacts. The DAF respectfully requests California Coastal Commission concurrence on this Negative Determination, in accordance with 15 CFR 930.35(a)(2).

The California Coastal Commission has previously concurred on Negative Determinations for similar missile launch programs at VSFB, including ground-based interceptor booster verification tests for the National Missile Defense Program (now termed Ground-Based Midcourse Defense, see below for details; CD-6-99, ND-016-99, ND-42-02, and ND-19-02) and Ground-Based Strategic Deterrent (GBSD) Test Program (ND-0004-21). The DAF has determined that the NGI program activities are similar to these activities for which consistency and negative determinations have been prepared in the past.

Project Description

The DAF, in cooperation with the Missile Defense Agency (MDA) and the Department of the Army, proposes to test, deploy, and operate an NGI to enhance the defense of the United States (U.S.) against intercontinental ballistic missile (ICBM) attack. The NGI would be an advanced interceptor (missile) fully capable of integration into the current MDA Ground-Based Midcourse Defense (GMD) system. Since 2004, the GMD system has been the principal defense of the U.S. homeland against ballistic missile threats. The Department of Defense (DoD) is pursuing more advanced capabilities to continue providing effective protection for the nation, including modernizing the GMD system with a more innovative interceptor to meet emerging threats. The NGI is intended to update and enhance the existing fleet of Ground-Based Interceptors (GBIs) currently emplaced at Fort Greely, Alaska and VSFB, California, and to enhance the defense of the U.S. against the threat of a limited strategic ballistic missile attack.

The Proposed Action at VSFB would include modifications of existing facilities and silos to accommodate the NGI and flight testing of the NGIs. The NGI flight test program is needed to ensure that the NGI can function and achieve operational status to augment the current GMD system. These activities are summarized in this letter and detailed in the Programmatic Environmental Assessment/Overseas Environmental Assessment (PEA/OEA) being prepared by the MDA that will be released for public review and comment in January 2024.

Project Location

VSFB is in central Santa Barbara County near the town of Lompoc. The installation occupies approximately 99,572 acres on the south-central coast of California and has 42 miles of Pacific Ocean coastline on its western boundary, extending from Point Sal in the north to Jalama Creek in the south. On VSFB, the major river drainages are San Antonio Creek and the Santa Ynez River, and the minor streams are Shuman, La Cañada Honda, Bear, and Jalama Creeks.

VSFB is headquarters for the Space Launch Delta 30 (SLD 30), which is the DAF organization responsible for DoD space and missile launch activities on the western coast of the U.S. SLD 30 supports West Coast launch activities for the DAF, the DoD, the MDA, the National Aeronautics and Space Administration, foreign nations, and private contractors that support national security payload launches. The western range at VSFB currently has the capability to support up to 110 rocket launches and 15 missile launches annually. Presently, an average of eight missile launches per year are conducted from VSFB (HB&A 2020).

NGI Facilities Update

The Proposed Action would require the use of several existing facilities on VSFB (Figure 1), including two launch facilities (LFs), LF-23 and LF-24, which have been previously used for GBI booster verification and flight tests. Only minor internal silo modifications are expected to be required to accommodate the NGI. Other facilities at VSFB may be modified for use in interceptor assembly, integration, checkout or for administrative and office space uses for the NGI program. No new facilities would be constructed, and no new ground disturbance would be required. Facility modification at VSFB could begin as early as third quarter fiscal year 2024. Heavy equipment typically used for construction (e.g., trucks, cranes, backhoes, post bore trucks, diesel generators) would be used during site preparations.

NGI Flight Testing at VSFB

The NGI flight tests at VSFB are expected to be like those previously conducted to test the current GBI system. Up to three NGI flight tests per year would be conducted from VSFB over the Pacific Ocean, beginning in 2026, and test launches are consistent with GBI booster verification flight tests described and analyzed for the CD-6-99, ND-016-99, ND-42-02, and

ND-19-02. The flight tests would consist of single and dual interceptor launches fired to intercept one or multiple ground- or air-launched targets over the Pacific Ocean.

Pre-launch preparations would continue to include the routine maintenance of firebreaks around LF-23 and LF-24. Shrubby and woody vegetation within at least 150 feet of the launch pads would be cleared to reduce the potential for wildfire. Grass would be mowed.

The types and amounts of hazardous materials used and stored during flight test operations would be minimal and consist of compressed gases, adhesives, lubricants, and solvents. Routine building maintenance and cleaning would require use of paints and cleaning products that are typically used on government installations. Solid and hazardous materials generated by the program would be collected, temporarily stored (as needed), and disposed of or recycled by means of existing installation facilities using established waste management procedures in accordance with established SLD 30 and DAF procedures and applicable federal and state laws and regulations as described in the Hazardous Materials and Hazardous Waste Management section of the NGI Draft PEA/OEA. Emissions from construction and testing of the NGI are analyzed in the NGI Draft PEA/OEA in accordance with state and federal regulations and annual emissions from the Proposed Action at VSFB would conform to the State Implementation Plan and comply with the General Conformity Rule. No exceedance of air quality standard or health-based standards of non-criteria pollutants is anticipated, and the Proposed Action would not result in significant impacts to air quality.

NGI flight tests would be conducted using the same range safety procedures used for the ongoing GBI flight tests. SLD 30 personnel would conduct a comprehensive safety analysis to determine specific launch and flight hazards for each flight test. The results of the analysis then would be used to identify the flight clearance areas, including the launch hazard area, expended booster drop zones, debris impact areas, terminal hazard areas, and flight termination boundary. Once they are defined, the Range Safety Officer would communicate the extent of the clearance area(s) and the time and date of the flight test to the Federal Aviation Administration, the U.S. Coast Guard, and appropriate emergency management agencies for assistance in the clearance of designated areas prior to launch.

Prior to each flight test, Notices to Mariners (NOTMARs) and Notices to Air Missions (NOTAMs) would be issued in the region of the flight test. Air traffic would be rerouted from clearance areas or rescheduled during the launch window. Areas such as oil rigs and shipping lanes would be cleared in accordance with existing SLD 30 standard operating procedures (SOPs). Flight Test Operators would adhere to health and safety SOPs for the launch. Depending on the planned launch trajectory, range safety procedures may require public access restrictions of Point Sal State Beach. Beach access restrictions would typically be for less than 12 hours, and time of day would vary based on launch timing. SLD 30 may also coordinate and monitor any train traffic passing through the installation. These actions are considered routine at VSFB and are dictated through SLC 30 SOPs (DAF 2006, DAF 2010).

NGIs would be launched from LF-23 or LF-24, with launch azimuth boundaries between 264–286 degrees. After launch, the interceptor would slowly gain speed in the first few seconds of flight and then rapidly accelerate out of sight and earshot. Approximately one minute into flight, the interceptor would be at an altitude of 30 miles and approximately 40 to 50 miles downrange. No debris is expected to fall on land or within the coastal zone; any debris would land in deep ocean areas more than 500 miles offshore in deep ocean areas. No nuclear or conventional explosive warheads would be used. Blast residue generated by the NGI flight tests at the launch pad would be contained within the silo and canister. The blast residue would be removed, containerized, and properly disposed of as hazardous waste according to local, state, and federal regulations.

ANALYSIS OF IMPACTS ON THE COASTAL ZONE

The effects test is a procedure where the project proponent determines whether the proposed activities comply with the federal consistency requirements of Section 307 of the CZMA (16 U.S.C. Section 1456) and its implementing regulations (15 C.F.R. Part 930). As defined in Section 304 of the CZMA, the term "coastal zone" does not include "lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government." However, per DAF implementing regulations (AFMAN 32-7003, Section 3.26.2), the DAF is required to undertake federal actions in a manner consistent to the maximum extent practicable with the enforceable policies[1] of California's approved coastal zone management programs through the federal consistency process under the CZMA.

The DAF analyzed the effects of the Proposed Action by looking at reasonably foreseeable direct and indirect effects on any coastal use or resource, and by reviewing relevant management program enforceable policies (15 C.F.R. Part 930.33(a)(1)) and by reviewing the enforceable policies of California's approved State Management Plan, codified in Chapter 3 of the California Coastal Act. As shown in the analysis below, the Proposed Action would not adversely affect coastal resources.

The potential environmental effects of the Proposed Action have been evaluated in a PEA/OEA in accordance with the National Environmental Policy Act of 1969, as amended (NEPA). The NGI Preliminary Draft PEA/OEA would be published for public review and comment in February 2024 and made available to the CCC concurrently[2]. This letter summarizes the findings of the Preliminary Draft PEA/OEA. The final PEA/OEA may be revised following the public comment period.

Public Access (CCA Section 30210 et seq.) and Recreation (CCA Section 30220 et seq.)

SLD 30 controls access to the installation, which is restricted to military personnel, DoD employees, authorized contractors, and official visitors. No changes to public access or recreation within the coastal zone would occur due to the Proposed Action.

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[1] SLD 30 is using the term "enforceable policies" within the meaning contemplated in 15 CFR 930.36. DAF does not concede that all aspects of California's coastal program are enforceable against the federal government.
[2] MDA is the lead agency for the PEA/OEA. As a cooperating agency, the DAF is the lead agency for regulatory consultations related to actions that will occur at Vandenberg SFB.

VSFB is adjacent to several public coastal recreational areas, including beaches and hiking trails. Of these, Point Sal Beach and Brown Road Trail are located near where NGI flight test launches would occur. Point Sal State Beach is adjacent to the northern end of VSFB and consists of 80 acres, including approximately 1.5 miles of ocean frontage. Access to the recreation area is limited to pedestrian access via the 5-mile-long Brown Road Trail, which crosses through VSFB property. Public access is allowed from sunrise to sunset for recreational purposes only.

During NGI test flights, Point Sal State Beach access would be temporarily restricted to protect public health and safety if test activities overlapped with daytime operating hours. Since 1979, an evacuation and closure agreement for Point Sal State Beach has been in place between the DAF and Santa Barbara County. Under continuing agreements with the County and the State of California, upon the DAF's request, the County Parks Department and County Sheriff's Office can close the state beach to public access for a period of up to 48 hours. According to SLD 30 safety, Point Sal State Beach access restrictions have occurred only a few (less than five) times per year over the last 10 years. Public notification about launches and beach restrictions would continue to occur in accordance with existing agreements between SLD 30 and Santa Barbara County. Because the flight test events would be temporary, consistent with the current program, and occur only a few times per year, the access restrictions would not significantly affect local recreation.

Overall, construction and flight test activities are not anticipated to result in significant noise impacts on recreation. Short-term increases in noise from the use of light and heavy equipment during facility modifications would occur only during daytime hours and would be temporary and not audible off federal property or in public recreational areas. Point Sal State Beach would not be subjected to noise levels that would affect use as elevated construction noise would not affect areas outside the installation and the recreation area would be closed during the infrequent launch activities.

As discussed above, the Proposed Action will not add any additional restrictions to Point Sal State Beach. Because impacts would remain the same as existing operations, the Proposed Action would not substantially diminish the protected activities, features, or attributes of Point Sal State Beach.

Due to the temporary and short-term duration of the activities (three launches annually) and no additional restrictions to public access at Point Sal State Beach, accessibility impacts associated with coastal recreational activities would remain negligible. Therefore, the Proposed Action would be consistent to the maximum extent practical with Section 30210 and 30220 of the CCA.

Marine Environment (CCA Section 30230 et seq.)

The proposed construction activities at VSFB only includes the modification of existing facilities. No new ground disturbance would be required, minimizing the potential for soil erosion. Best management practices would be implemented to avoid or minimize the potential for accidental releases of fuels/oils during construction. SLD 30 and its contractors would follow the established installation stormwater management plan (and site-specific plans as appropriate) and hazardous waste management plan to ensure that there would be no changes in water quality during construction activities as described in the NGI Draft PEA/OEA. The combination of distance from the ocean, use of protective measures during construction, and adherence to established environmental protection plans would avoid any potential effects to the marine environment.

The types of potential stressors for marine species from NGI flight test activities at VSFB would be the same as those for the ongoing GBI and Minuteman III test launches and are primarily due to increased noise levels during launch. No debris would be expected to fall on land or within the coastal zone. Noise exposure levels from missile launches can be characterized from moderately loud to uncomfortable, but they occur infrequently and are very short in duration (about 20 seconds per launch). Due to missile launch trajectory and flight characteristics, no sonic booms are audible along California coastal zones from missile launches (DAF 2023). The DAF has consulted with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) on the effects of base-wide operations, including missile launches, on marine mammals and Endangered Species Act (ESA)-listed species. Due to the potential marine mammal disturbance from all types of vehicle launches and aircraft overflights at VSFB, the DAF has consulted with NMFS and has obtained a Letter of Authorization (LOA) for the incidental take by Level B harassment permit of Pacific harbor seals, California sea lions, northern elephant seals, Guadalupe fur seals, and Steller sea lions (NMFS 2019). The current LOA is valid through April 2024; SLD 30 Installation Management Flight has applied for an updated LOA (USSF 2023). While take by Level B harassment is not expected for the Proposed Action, NMFS has concluded that any permitted takes by Level B harassment due to test activities at VSFB would have no more than a negligible impact on the affected species and stocks (NMFS 2019). No significant impacts to hauled-out pinnipeds or to other wildlife species are expected to occur because of elevated noise levels or vehicle overflight at VSFB (MDA 2023). The DAF has determined that the Proposed Action would not result in population-level impacts on any marine resources and biological productivity of coastal waters would be maintained for long-term commercial, recreational, scientific, and educational purposes. Therefore, the Proposed Action would be consistent to the maximum extent practicable with Section 30230 of the CCA.

The DAF has determined that the Proposed Action would not result in population-level impacts on any marine resources and biological productivity of coastal waters would be maintained for long-term commercial, recreational, scientific, and educational purposes. Therefore, the Proposed Action would be consistent to the maximum extent practicable with Section 30230 of the CCA.

Marine Environment: Commercial and Recreational Fishing (CCA Section 30234)

Recreational and commercial boating and fishing occurs offshore of VSFB; however, impacts on offshore activities are unlikely other than temporary avoidance areas established during launch activities. Temporary avoidance areas for security and safety would not limit public access to adjacent areas. Areas would only be closed for the duration of the launch activity. The U.S. Coast Guard (USCG) would issue a NOTMAR that defines the closure time and public ship avoidance area for launch events. NOTMARs are currently regularly issued to advise mariners of hazardous operations conducted from VSFB, including vehicle launches. NOTMARs are issued 10 days prior to a planned launch. The USCG transmits marine radio broadcast warnings to inform vessels of the effective closure time of the launch hazard area(s). The avoidance area would be lifted as soon as the USCG determines it is safe to do so. Any impacts to recreation resources would be infrequent and temporary and would not result in a significant impact on recreation resources. These launches would be included in communications with local ports that have been initiated under separate consultation (CD-0010-22). While the exact timing and boundaries of the NOTMARs are unknown, closures for NGI flight tests could close portions of commercial fisheries including crab, flatfish, rockfish, roundfish, shrimp, and tuna fisheries, but would typically only affect boating activities for less than 12 hours per test event. Due to the infrequency and short duration of these closures, broadcasting of NOTMARs, and the expansive offshore area that would still be available to the public, the Proposed Action would be consistent to the maximum extent practicable with Section 30234 of the CCA.

Land Resources (CCA Sections 30240(b) and 30244 et seq.)

Facilities proposed for use under the Proposed Action include existing missile launch and launch support facilities are located on federal property or off base outside of designated coastal zones.

There are no known historic properties or prehistoric archaeological resources within the Area of Potential Effects for the Proposed Action at VSFB. Therefore, the Proposed Action would have no impacts on known historic properties. Should inadvertent discoveries be made during construction or demolition, the standard operating procedures for inadvertent discoveries of archaeological resources outlined in the installation's Integrated Cultural Resources Management Plan would be implemented.

VSFB is within the Southern California Coast ecoregion. Site preparation activities for the Proposed Action would result in no permanent loss or modification of habitats or vegetation types. All construction activities would occur within existing facility footprints that are previously disturbed and would require no new or additional ground disturbance. No native vegetation or previously disturbed revegetated areas would be cleared, converted, or otherwise impacted by the construction activities. There are no agricultural areas or timberlands within the vicinity of the Proposed Action. Construction activities including human presence and construction noise may disturb wildlife; however, effects would be limited to short-duration behavioral responses that would cause minimal, short-term impacts.

Proposed launch activities are not expected to change the abundance or distribution of any plant species or vegetation type at VSFB. Based on current and future activities, LF 23 and LF 24 (Appendix 3), including the firebreak areas outside the fence line at the LFs are categorized as Developed (Sawyer et al. 2009) and is composed of sparse coverage of disturbance-adapted species including iceplant (*Carpobrotus edulis*) and grassland tarplant (*Deinandra increscens* ssp *increscens*) (Appendix 4). Routine maintenance of firebreaks around the LFs minimizes the potential for impacts on vegetation by reducing vegetation exposure and reducing the risk of wildfire. Firebreaks are regularly mowed to manage vegetation height and density. No new firebreaks would be established under the Proposed Action.

One federally listed plant species protected under the ESA, Gaviota tarplant (*Deinandra increscens* ssp. *villosa*), has been documented at LF-24 and may occur within the managed firebreaks around the LFs (Attachment 3). Periodic mowing and other vegetation maintenance would thus have an “adverse effect” on the species (USFWS 2015). However, routine maintenance of firebreaks is currently conducted using minimization measures to avoid and reduce adverse effects on Gaviota tarplant and these activities would not reduce the reproduction, numbers, or distribution of this species (USFWS 2015). Firebreak maintenance would continue under the terms of the 2018 Biological Opinion and subsequent updates to required mitigation and conservation measures (Attachment 5).

Wildlife may be exposed to elevated noise and visual disturbance from facility modification and use, vehicle launch and overflight, launch emissions, and contact with fragments or hazardous chemicals in the event of a launch failure or early flight termination. Proposed Activities are likely to adversely affect the federally listed California red-legged frog (*Rana draytonii*) if individuals dispersed from distant appropriate habitat during periods of high rainfall and increased movement (Attachment 5). Impacts associated with these activities would be minimal, intermittent, and temporary. With implementation of measures identified the 2018 USFWS Programmatic Biological Opinion, the USFWS concluded that missile launch activities within the scope specified would not jeopardize the continued existence of red-legged frogs (USFWS 2018). The project fits within the scope of the actions described in the 2015 and 2018 Programmatic BO, and all pertinent minimization measures will be implemented to reduce or avoid adverse effects (Attachment 5). Analysis of additional special status terrestrial species potentially occurring in the Proposed Action area is provided in the Proposed Draft PEA/OEA to be submitted for public review in February 2024. A list of special status species potentially occurring in the Proposed Action area is provided in Attachment 4. No significant impacts to hauled out pinnipeds or to other wildlife species are expected to occur because of elevated noise levels or vehicle overflight at VSFB (USAF 2020).

Facility modifications would be limited to existing facility footprints and would not increase impermeable surface area or increase stormwater runoff. Flight tests would not be anticipated to affect water resources or local hydrology. If an early launch termination were to occur, actions would immediately be taken to remove unburned propellant and any other hazardous materials that had fallen into waterbodies or off the beach in waters up to 6 feet deep. Any recovery from deeper water would be treated on a case-by-case basis. VSFB would adhere to all established permits, SOPs, and regulations to maintain water quality health.

Because measures will be taken to prevent, minimize, and compensate for impacts, the Proposed Action would be consistent to the maximum extent practicable with Sections 30240(b) and 30244 of the CCA.

Development (CCA Section 30250 et seq.)

The Proposed Action does not include any new construction. The proposed modifications to the interior of existing facilities would not adversely affect the visual or scenic qualities of coastal areas, and no coastal viewing sites are present near the facilities proposed for modification. Therefore, the Proposed Action is consistent to the maximum extent practicable with Section 30250 of the CCA.

CONCLUSION

DAF has determined that the development and testing of the NGI at VSFB would not adversely affect uses or resources of the California coastal zone. Facilities at VSFB would be used to support a new launch program and the types of operations and maintenance activities proposed to occur would be like those of their current and prior usage. Because the overall proposed activities would not have a significant impact on physical and natural resources, require implementation of new restrictions to beach access or other recreational areas, or adversely affect the visual qualities of the coastline, the DAF has determined the Proposed Action would not adversely affect coastal resources and would be consistent with California's approved coastal zone management programs through the federal consistency process under the CZMA.

If you need additional information or have questions, please call me at (805) 605-7924 or email at beatrice.kephart@spaceforce.mil. You can also call Tiffany Whitsitt-Odell at (805) 606-2044 or email at tiffany.whitsitt-odell@spaceforce.mil.

Sincerely

KEPHART.BEATRICE.LINDA.1166122291 Digitally signed by KEPHART.BEATRICE.LINDA.1166122291 Date: 2024.04.01 12:29:21 -07'00'

BEATRICE L. KEPHART
Chief, Installation Management Flight

Attachments:

1. References
2. Location of existing VSFB facilities proposed for use for the NGI Program
3. Vegetation Communities at the Launch Facilities (LF) in the Proposed Action Area
4. Special Status Terrestrial Species with the Potential to Occur within the Proposed Action Area
5. USFWS Section 7 Response to Pre-notification

Attachment 1

REFERENCES

DAF (U.S. Department of the Air Force), 2006. Final Environmental Assessment—Minuteman III ICBM Extended Range Flight Testing. February 2006.

_____, 2010. Final Environmental Assessment for Conventional Strike Missile Demonstration. August 2010.

MDA (Missile Defense Agency), 2023. Ground-Based Midcourse Defense Next Generation Interceptor Draft Programmatic Environmental Assessment/Overseas Environmental Assessment.

NMFS (National Marine Fisheries Service), 2019. Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to U.S. Air Force Launches and Operations at Vandenberg Air Force Base, California. Final rule; issuance of Letters of Authorization (LOA). 84 Federal Register 14314. April 10, 2019.

Sawyer, J.O., T. Keeler-Wolf, and J. M. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society, Sacramento, CA. 1300 pp.

USFWS (U.S. Fish and Wildlife Service), 2015. Programmatic Biological Opinion on Routine Mission Operations and Maintenance Activities, Vandenberg Air Force Base, Santa Barbara County, California (8-8-13-F-49R). December 3, 2015.

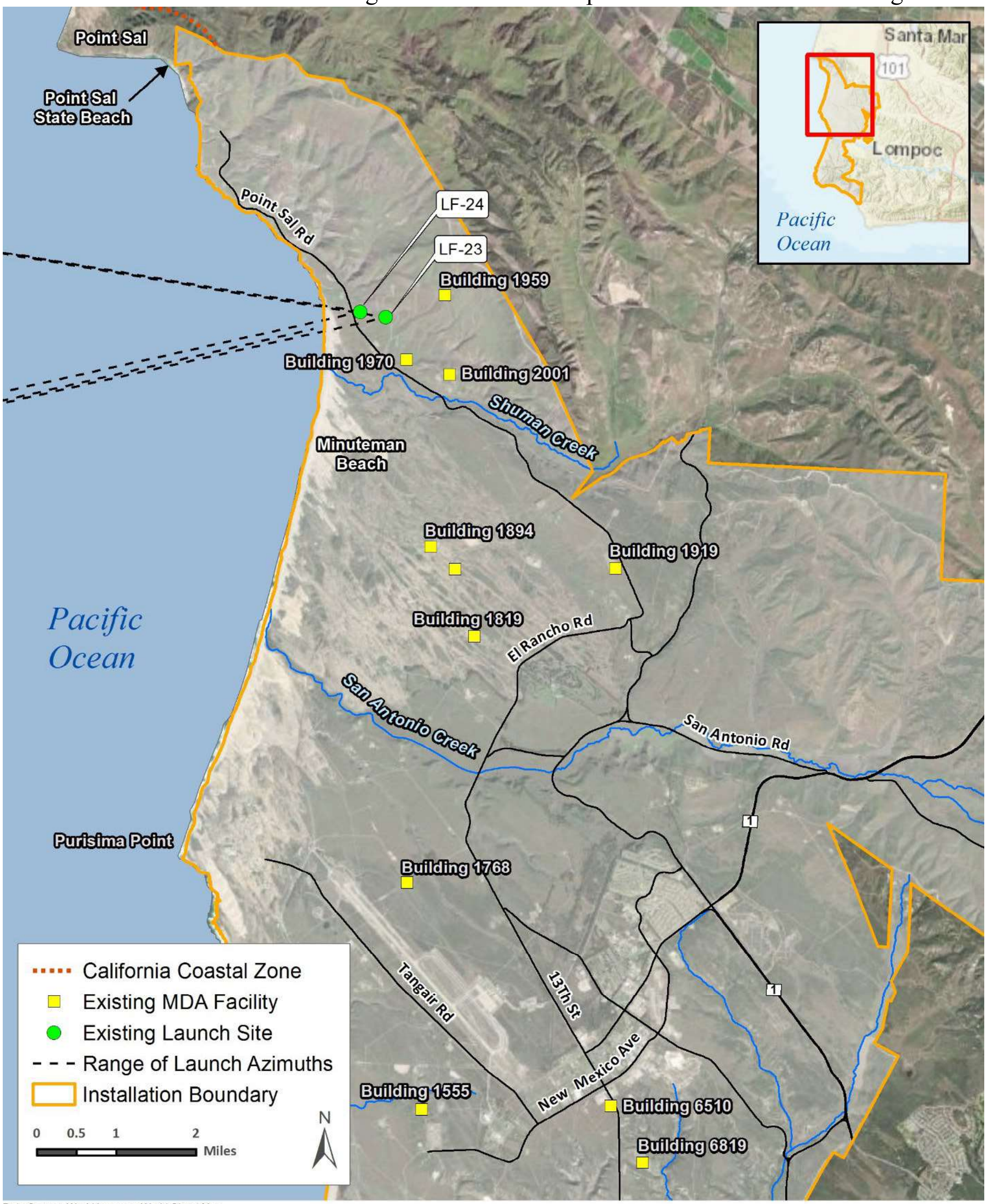
_____, 2018. Reinitiating of Programmatic Biological Opinion on Routine Mission Operations and Maintenance Activities, Vandenberg Air Force Base, Santa Barbara County, California. November 20, 2018.

USAF (U.S. Air Force). 2020. Final Supplemental Environmental Assessment for Minuteman III Modification and Fuze Modernization. February 2020.

USSF (U.S. Space Force), 2021. VSFB Integrated Natural Resources Management Plan, September 2021.

_____, 2023. Application for Incidental Take Regulations and Letter of Authorization; U.S. Space Force Launches, U.S. Air Force Aircraft and Helicopter Operations at Vandenberg Space Force Base, California. Submitted to NOAA National Marine Fisheries Service. Submitted by United States Space Force, Space Delta 30 - 30 CES/CEIEA. May 25, 2023.

Attachment 2. Locations of Existing VSFB Facilities Proposed for Use for the NGI Program



Data Source: World Imagery; World Street Map

Attachment 3. Vegetation Communities at the Launch Facilities (LF) in the Proposed Action Area

Attachment 4. Special Status Terrestrial Species with the Potential to Occur within the Proposed Action Area

Species	Status		Potential to Occur within the Proposed Action Area
	USFWS ESA/ MMPA	CDFW	
Plants			
Gaviota Tarplant (*Deinandra increscens* ssp. *villosa*)	E	-	Present at LF-24
Marine Mammals			
Pacific harbor seal (*Phoca vitulina*)	MMPA		Potential: occurs at haul-outs on VSFB beaches at low tide
California sea lion (*Zalopus californianus*)	MMPA		Unlikely: Not typically observed on north VSFB beaches
Elephant seal (*Mirounga angustirostris*)	MMPA		Unlikely: Not typically observed on north VSFB beaches
Steller sea lion (*Eumetopias jubatus*)	MMPA		Unlikely: Not typically observed on north VSFB beaches
Southern sea otter (*Enhydra lutris nereis*)	T		Potential: occurs in nearshore waters near, primary rafting area near Purisima Point
Birds			
Marbled murrelet (*Brachyramphus marmoratus*)	T		Potential: observed rarely in nearshore waters near Purisima Point and Point Sal
Western Snowy Plover (*Charadrius nivosus nivosus*)	T		Likely: occurs year round on beaches and dunes
California least tern (*Sternula antillarum browni*)	E		Likely: occurs along coastal California
California brown pelican (*Pelecanus occidentalis californicus*)	-	Fully protected	Likely: forages in nearshore ocean waters
Grasshopper Sparrow (*Ammodramus savannarum*)	-	SSC nesting	Potential: may forage near the sites
Loggerhead Shrike (*Lanius ludovicianus*)	BCC	SSC nesting	Potential: may forage in or near the sites
Northern Harrier (*Circus hudsonius*)	-	SSC nesting	Likely: may forage near the sites
Oak Titmouse (*Baeolophus inornatus*)	BCC	-	Potential: may nest in nonnative tree habitat near the sites

Species	Status		Potential to Occur within the Proposed Action Area
	USFWS ESA/ MMPA	**CDFW**	
Peregrine falcon (*Falco peregrinus anatum*)	BCC	Fully protected nesting	Potential: may forage near the sites
White-Tailed Kite (*Elanus leucurus*)	-	Fully protected nesting	Likely: may forage near the sites
Western burrowing owl (burrow sites) (*Athene cunicularia hypogea*)	BCC	SSC	Potential: may occur near the sites
Terrestrial Mammals			
American badger (*Taxidea taxus*)	-	CCS	Potential: may inhabit grassland habitats
Reptiles			
Northern Legless Lizard (*Anniella pulchra*)	-	SSC	Likely: occurs in sandy habitats throughout central California.
Amphibians			
California Red-legged Frog (*Rana draytonii*)	T	Fully protected SSC	Potential: Occurs in nearly all permanent lakes, streams, and ponds on VSFB

Note: CDFW = California Department of Fish and Wildlife; FE = Federally Endangered; FT = Federally Threatened; BCC = Birds of Conservation Concern; SSC = Species of Special Concern; USFWS = U.S. Fish and Wildlife Service

Attachment 5. USFWS Section 7 Response to Pre-notification

-----Original Message-----
From: [redacted]@fws.gov>
Sent: Tuesday, January 9, 2024 4:29 PM
To: [redacted]@spaceforce.mil>;
[redacted]@fws.gov>
Cc: [redacted]@fws.gov>; [redacted]
spaceforce.mil>; [redacted]
spaceforce.mil>
Subject: [Non-DoD Source] RE: [EXTERNAL] FW: MDA - NGI - USFWS Prenotification response

2022-0003583-S7-030
Hi [redacted],
We are responding to your notification sent via electronic mail and originally received on November 29, 2023, regarding the Missile Defense Agency (MDA) Next Generation Interceptor (NGI) at Launch Facility (LF) 24 on North Vandenberg. Our staff corresponded between December 4, 2023, and January 3, 2024, to help clarify project details and relevant information. The project would involve modification of existing facilities and silos at LF 24. Modifications would include removal, replacement and/or reinforcement of existing concrete or asphalt using heavy equipment (trucks, cranes, backhoes, post bore trucks, diesel generators). The total project area would be approximately 4.9 acres of previously disturbed area and no ground disturbance outside of existing facility footprints would be required. After the completion of modifications, the project would include routine mowing approximately every six weeks within the fence line and firebreak maintenance prior to launches and annually, as needed. The project would also include transportation and receipt of the NGI, assembly and integration of NGI components, storage, final inspection, and checkout of the NGI. Additionally, the project would include ground and flight testing, and ultimately deployment and operation of the NGI. This project is expected to start in summer 2024.

Under the Terms and Conditions of the Programmatic Biological Opinion, Vandenberg Air Force Base, Santa Barbara County, California (8-8-13-F-49R), you are required to notify us of project activities that may adversely affect any federally listed species analyzed within this programmatic biological opinion (PBO). You have determined that this project is likely to adversely affect the federally threatened California red-legged frog (*Rana draytonii*) and federally endangered Gaviota tarplant (*Deinandra increscens* ssp. *villosa*).

The PBO described projects of this nature under section 1.1 Space and Missile Launch Operation on page 12 and 2.3 Landscaping (mowing) on page 23 and described the effects of these project activities to California red-legged frog on page 114 and effects of these project activities to Gaviota tarplant on page 99. Your notification states that no California red-legged frog have been observed within the project area and that a number have been recorded nearby in Shuman Creek, about 0.77-0.85 mile south. Due to the potential presence of California red-legged frog in the project area, the Service understands that the Space Force will limit construction and site maintenance (mowing) activities to periods outside of active rainfall to minimize the possibility of adverse effects (8-8-13-F-49R, Measure #1, page 48 and 2018-F-0664, Measure #14, page 2). The Service also understands that the Space Force will limit these activities to occur outside of hours of darkness to further minimize effects. The Service understands that the Space Force will review ephemeral drainages (Service 2023) adjacent to the project area and will implement California red-legged frog specific avoidance and minimization measures outlined in the reinitiated PBO (2018-F-0664) dated November 20, 2018, as applicable.

Your notification states that the project area was previously known to contain multiple small areas of Gaviota tarplant in 2011 just outside of the project fenceline. No Gaviota tarplant was observed in October 2023 but the species may be disturbed if present during remodeling and continued maintenance that occurs within the fenceline. The Service understands that the Space Force will not implement topsoil salvage for this project (L. Lum., pers. comm. 2023) and that the species has not been redocumented following previous repeat disturbances of the occupied area. However, to minimize potential effects to the species given the possible dormant seedbank, the Service understands the Space Force would time firebreak mowing operations, which would occur outside of the fenceline where occupied habitat has been previously documented, to occur following Gaviota tarplant seed set and before the rainy season (Species Specific Measure #2 described on page 44 of the PBO). The Space Force will also implement Gaviota tarplant Species Specific Measure #4 (2:1 habitat enhancement, page 44) in areas adjacent to high quality Gaviota tarplant habitat to attempt to minimize potential loss of occupied habitat.

Following implementation of minimization, in the event the Space Force observes an overall net loss of occupied Gaviota tarplant, the Service encourages the Space Force to coordinate with us on potential identified actions recommended to help promote the recovery of the species (refer to Service 2022, p. 17-18).

Per your notification, the Space Force will implement all other minimization and avoidance measured outlined in sections 7.1 and 7.2 of the PBO.

In conclusion, provided the Space Force also implements all appropriate terms and conditions, we agree that the project activities included in your notification can go forward under the PBO without further consultation. If you have any questions regarding our response to your pre-project notification, please contact [redacted]@fws.gov) by electronic mail.

Lit Cited:

Lum, L. 2023. Email with [redacted], Biologist, USFWS, re: Gaviota tarplant planned minimization surrounding LF-24. Dated December 15, 2023.

[Service] U.S. Fish and Wildlife Service. 2022. Gaviota tarplant (Deinandra increscens ssp. villosa [Hemizonia increscens ssp. villosa]) 5-year Review: Evaluation and summary. 25 pp.

[Service] U. S. Fish and Wildlife Service. 2005. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Imagery of aquatic features within mile vicinity surrounding LF-24. Accessed Jan 9, 2024.

Sincerely,

[redacted]

Senior Fish and Wildlife Biologist
USFWS, Ventura Field Office

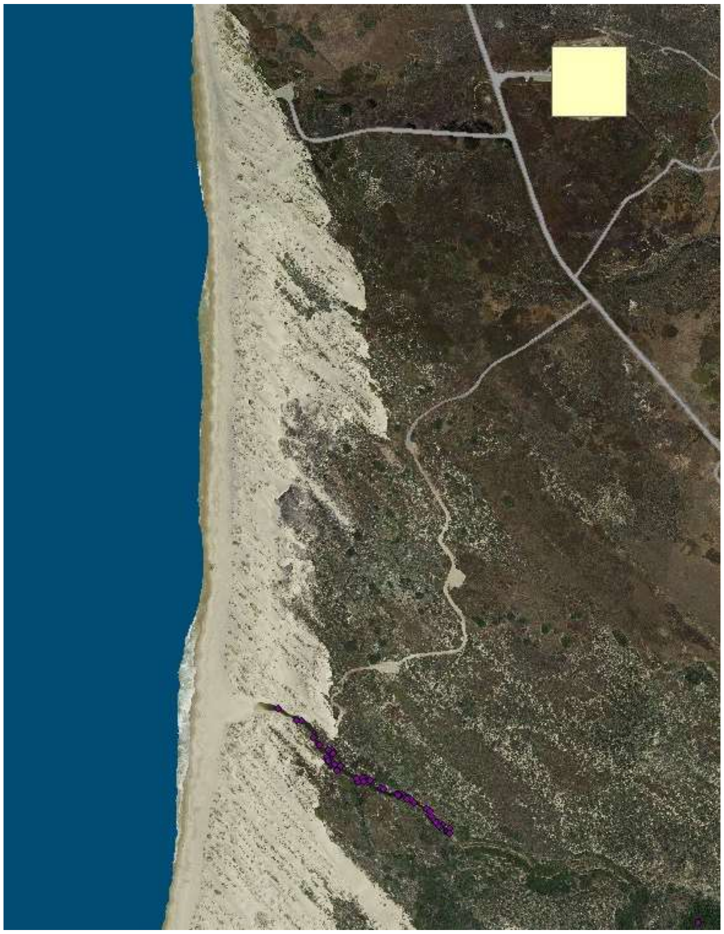
[redacted]

Site Map or Imagery:

Figure 1: Project area (this figure includes an inset map with the general location on base).

Figure 2: Project map. LF 24 with Gaviota tarplant surveyed in 2011.

Figure 3: Project location (yellow square) and nearest known CRLF (purple dots) in Shuman Creek.



CALIFORNIA COASTAL COMMISSION
ENERGY, OCEAN RESOURCES AND FEDERAL CONSISTENCY
455 MARKET STREET, SUITE 300
SAN FRANCISCO, CA 94105
VOICE (415) 904-5260

June 20, 2024

Beatrice L. Kephart
Department of the Air Force
United States Space Force
30 CES/CEI
1028 Iceland Avenue
Vandenberg SFB, CA 93437-6919
Via email: beatrice.kephart@spaceforce.mil

Re: Negative Determination No. ND-0027-24: Missile Defense Agency Next Generation Interceptor Development and Testing

Dear Chief Kephart:

On April 1, 2024, the Coastal Commission received the U.S. Space Force's negative determination for the Department of the Air Force's proposal, in cooperation with the Missile Defense Agency and Department of the Army, to proposes to test, deploy, and operate a Next Generation Interceptor (NGI) at Vandenberg Space Force Base (VSFB) to enhance the defense of the United States against intercontinental ballistic missile attack.

The NGI would be an advanced interceptor (missile) fully capable of integration into the current Missile Defense Agency Ground-Based Midcourse Defense system. The project would include modifications of existing facilities and silos to accommodate the NGI and flight testing of the NGIs. No new facilities would be constructed, and no new ground disturbance would be required. Facility modification at VSFB could begin as early as third quarter fiscal year 2024.

The project would also include flight testing of the NGI. Up to three NGI flight tests per year would be conducted from VSFB over the Pacific Ocean, beginning in 2026, and test launches are consistent with GBI booster verification flight tests described and analyzed for the CD-6-99, ND-016-99, ND-42-02, and ND-19-02. The flight tests would consist of single and dual interceptor launches fired to intercept one or multiple ground- or air-launched targets over the Pacific Ocean.

The 60-day time period for Commission review of this negative determination ended on June 1, 2024, and no additional review time was requested. Consequently, you may **presume California Coastal Commission concurrence** with negative determination ND-

027-24, pursuant to 15 CFR Section 930.35(c) of the NOAA CZMA implementing regulations.

Please contact Cassidy Teufel at Cassidy.Teufel@coastal.ca.gov if you have any questions regarding this matter.

Sincerely,

CASSIDY TEUFEL
Federal Consistency Coordinator
(for)

Dr. Kate Huckelbridge
Executive Director

Appendix B: Species Lists

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Species List for Vandenberg Space Force Base

Common Name	Scientific Name
Terrestrial Mammals	
Virginia opossum	*Didelphis virginiana*
Ornate shrew	*Sorex ornatus*
Trowbridge’s shrew	*Sorex trowbridgii*
Broad-footed mole	*Scapanus latimanus*
Coyote	*Canis latrans*
Northern gray fox	*Urocyon cinereoargenteus*
Bobcat	*Lynx rufus*
Puma	*Puma concolor*
Striped skunk	*Mephitis mephitis*
Long-tailed weasel	*Mustela frenata*
American badger	*Taxidea taxus*
Northern raccoon	*Procyon lotor*
American black bear	*Ursus americanus*
Feral pig	*Sus scrofa scrofa* x *S. s. domestica*
Mule deer	*Odocoileus hemionus*
Western gray squirrel	*Sciurus griseus*
California ground squirrel	*Otospermophilus beecheyi*
North American beaver	*Castor canadensis*
Botta’s pocket gopher	*Thomomys bottae*
Agile kangaroo rat	*Dipodomys agilis*
Heermann’s kangaroo rat	*Dipodomys heermanni*
California pocket mouse	*Chaetodipus californicus*
California vole	*Microtus californicus*
Dusky-footed woodrat	*Neotoma fuscipes*
San Diego Desert woodrat	*Neotoma lepida intermedia*
Brush deermouse	*Peromyscus boylii*
California deermouse	*Peromyscus californicus*
Eastern deermouse	*Peromyscus maniculatus*
Pinyon deermouse	*Peromyscus truei*

Common Name	Scientific Name
Western harvest mouse	*Reithrodontomys megalotis*
Black-tailed jackrabbit	*Lepus californicus*
Desert cottontail	*Sylvilagus audubonii*
Brush rabbit	*Sylvilagus bachmani*
Western mastiff bat	*Eumops perotis californicus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Pallid bat	*Antrozous pallidus*
Townsend's big-eared bat	*Corynorhinus townsendii*
Big brown bat	*Eptesicus fuscus*
Silver-haired bat	*Lasionycteris noctivagans*
Eastern red bat	*Lasiurus borealis*
Northern hoary bat	*Lasiurus cinereus*
California myotis	*Myotis californicus*
Yuma myotis	*Myotis yumanensis*
Marine Mammals	
Southern sea otter	*Enhydra lutris nereis*
Northern fur seal	*Callorhinus ursinus*
California sea lion	*Zalophus californianus*
Northern elephant seal	*Mirounga angustirostris*
Pacific harbor seal	*Phoca vitulina richardii*
Common minke whale	*Balaenoptera acutorostrata*
Blue whale	*Balaenoptera musculus*
Fin whale	*Balaenoptera physalus*
Humpback whale	*Megaptera novaeangliae*
Gray whale	*Eschrichtius robustus*
Common dolphin	*Delphinus delphis*
Risso's dolphin	*Grampus griseus*
Pacific white-sided dolphin	*Sagmatias obliquidens*
Northern right-whale dolphin	*Lissodelphis borealis*
Killer whale	*Orcinus orca*
Striped dolphin	*Stenella coeruleoalba*

Common Name	Scientific Name
Common bottlenose dolphin	*Tursiops truncatus*
Harbor porpoise	*Phocoena phocoena*
Dall's porpoise	*Phocoenoides dalli*
Sperm whale	*Physeter macrocephalus*
Inshore Saltwater Game Fish	
Diamond turbot	*Pleuronichthys guttulatus*
California grunion	*Leuresthes tenuis*
Jacksmelt	*Atherinopsis californiensis*
White croaker	*Genyonemus lineatus*
Yellowfin croaker	*Umbrina roncador*
Barred surfperch	*Amphistichus argenteus*
Calico surfperch	*Amphistichus koelzi*
Redtail surfperch	*Amphistichus rhodoterus*
Walleye surfperch	*Hyperprosopon argenteum*
Black perch	*Embiotoca jacksoni*
Opaleye	*Girella nigricans*
Kelp rockfish	*Sebastes atrovirens*
Grass rockfish	*Sebastes rastrelliger*
Cabezon	*Scorpaenichthys marmoratus*
Lingcod	*Ophiodon elongatus*
Kelp bass	*Paralabrax clathratus*
Freshwater Fish	
Starry flounder	*Platichthys stellatus*
Unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*
Channel catfish	*Ictalurus punctatus*
Western mosquitofish	*Gambusia affinis*
Pacific staghorn sculpin	*Leptocottus armatus*
Tidewater goby	*Eucyclogobius newberryi*
Steelhead	*Oncorhynchus mykiss*
Largemouth bass	*Micropterus salmoides*
Bluegill	*Lepomis macrochirus*

Common Name	Scientific Name
Redear sunfish	*Lepomis microlophus*
Green sunfish	*Lepomis cyanellus*
Black crappie	*Pomoxis nigromaculatus*
Sacramento perch	*Archoplites interruptus*
Common carp	*Cyprinus carpio*
Fathead minnow	*Pimephales promelas*
Arroyo chub	*Gila orcutti*
Important Marine Invertebrates	
California spiny lobster	*Panulirus interruptus*
Rock crab	*Cancer* sp.
Red abalone	*Haliotis rufescens*
Green abalone	*Haliotis fulgens*
Black abalone	*Haliotis cracherodii*
Amphibians	
California newt	*Taricha torosa*
Ensatina	*Ensatina eschscholtzii*
Arboreal salamander	*Aneides lugubris*
California tiger salamander	*Ambystoma californiense*
Black-bellied slender salamander [1]	*Batrachoseps nigriventris*
Western spadefoot	*Spea hammondii*
Western toad	*Bufo boreas*
Pacific treefrog	*Pseudacris regilla*
California red-legged frog	*Rana draytonii*
American bullfrog	*Lithobates catesbeianus*
Reptiles	
Southwestern pond turtle	*Actinemys pallida*
Pond slider	*Trachemys scripta*
Western fence lizard	*Sceloporus occidentalis*
Common side-blotched lizard	*Uta stansburiana*
Blainville's [=Coast] horned lizard	*Phrynosoma blainvillii*
Western skink	*Plestiodon skiltonianus*

Common Name	Scientific Name
Southern alligator lizard	*Elgaria multicarinata*
California legless lizard	*Anniella pulchra*
Ring-necked snake	*Diadophis punctatus*
Western yellow-bellied racer	*Coluber constrictor mormon*
California striped racer	*Masticophis* [=*Coluber*] *lateralis lateralis*
Gopher snake	*Pituophis catenifer*
Common kingsnake	*Lampropeltis californiae*
Common garter snake	*Thamnophis sirtalis*
Coast garter snake	*Thamnophis elegans terrestris*
Two-striped garter snake	*Thamnophis hammondii*
Southern Pacific Rattlesnake	*Crotalus oreganus*
Birds	
Red-throated loon	*Gavia stellata*
Pacific loon	*Gavia pacifica*
Common loon	*Gavia immer*
Pied-billed grebe [2]	*Podilymbus podiceps*
Horned grebe	*Podiceps auritus*
Eared grebe	*Podiceps nigricollis*
Western grebe	*Aechmophorus occidentalis*
Clark’s grebe	*Aechmophorus clarkii*
Pink-footed shearwater	*Ardenna creatopus*
Sooty shearwater	*Ardenna grisea*
Black-vented shearwater	*Puffinus opisthomelas*
Ashy storm-petrel	*Hydrobates homochroa*
California brown pelican	*Pelecanus occidentalis californicus*
Brandt’s cormorant [2]	*Phalacrocorax penicillatus*
Double-crested cormorant	*Phalacrocorax auritus*
Pelagic cormorant [2]	*Phalacrocorax pelagicus*
American bittern	*Botaurus lentiginosus*
Least bittern	*Ixobrychus exilis*
Great blue heron [2]	*Ardea herodias*

Common Name	Scientific Name
Great egret	*Ardea alba*
Snowy egret	*Egretta thula*
Cattle egret	*Bubulcus ibis*
Green heron [2]	*Butorides virescens*
Black-crowned night heron	*Nycticorax nycticorax*
White-faced ibis	*Plegadis chihi*
Turkey vulture [2]	*Cathartes aura*
Greater white-fronted goose	*Anser albifrons*
Snow goose	*Anser caerulescens*
Canada goose	*Branta canadensis*
Brant	*Branta bernicla*
Tundra swan	*Cygnus columbianus*
Wood duck	*Aix sponsa*
Gadwall [2]	*Mareca strepera*
American wigeon	*Mareca americana*
Mallard [2]	*Anas platyrhynchos*
Blue-winged teal	*Spatula discors*
Cinnamon teal [2]	*Spatula cyanoptera*
Northern shoveler	*Spatula clypeata*
Northern pintail [2]	*Anas acuta*
Green-winged teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Greater scaup	*Aythya marila*
Lesser scaup	*Aythya affinis*
Surf scoter	*Melanitta perspicillata*
Velvet scoter	*Melanitta fusca*
Common scoter	*Melanitta nigra*
Long-tailed duck	*Clangula hyemalis*
Bufflehead	*Bucephala albeola*

Common Name	Scientific Name
Common goldeneye	*Bucephala clangula*
Common merganser	*Mergus merganser*
Red-breasted merganser	*Mergus serrator*
Ruddy duck [2]	*Oxyura jamaicensis*
Osprey	*Pandion haliaetus*
White-tailed kite [2]	*Elanus leucurus*
Bald eagle	*Haliaeetus leucocephalus*
Northern harrier [2]	*Circus hudsonius*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk [2]	*Accipiter cooperii*
Red-shouldered hawk [2]	*Buteo lineatus*
Red-tailed hawk [2]	*Buteo jamaicensis*
Ferruginous hawk	*Buteo regalis*
Rough-legged hawk	*Buteo lagopus*
Golden eagle	*Aquila chrysaetos*
American kestrel [2]	*Falco sparverius*
Merlin	*Falco columbarius*
American peregrine falcon [2]	*Falco peregrinus anatum*
Prairie falcon	*Falco mexicanus*
California quail [2]	*Callipepla californica*
Virginia rail [2]	*Rallus limicola*
Sora [2]	*Porzana carolina*
Common moorhen	*Gallinula chloropus*
American coot [2]	*Fulica americana*
Black-bellied plover	*Pluvialis squatarola*
Pacific golden-plover	*Pluvialis fulva*
Western snowy plover [2]	*Charadrius alexandrinus nivosus*
Semipalmated plover	*Charadrius semipalmatus*
Killdeer [2]	*Charadrius vociferus*
Mountain plover	*Charadrius montanus*
Black oystercatcher [2]	*Haematopus bachmani*

Common Name	Scientific Name
Black-necked stilt [2]	*Himantopus mexicanus*
American avocet	*Recurvirostra americana*
Greater yellowlegs	*Tringa melanoleuca*
Lesser yellowlegs	*Tringa flavipes*
Spotted sandpiper	*Actitis macularius*
Solitary sandpiper	*Tringa solitaria*
Willet	*Tringa semipalmata*
Wandering tattler	*Tringa incana*
Whimbrel	*Numenius phaeopus*
Long-billed curlew	*Numenius americanus*
Marbled godwit	*Limosa fedoa*
Ruddy turnstone	*Arenaria interpres*
Black turnstone	*Arenaria melanocephala*
Surfbird	*Calidris virgata*
Red knot	*Calidris canutus*
Sanderling	*Calidris alba*
Semipalmated sandpiper	*Calidris pusilla*
Western sandpiper	*Calidris mauri*
Least sandpiper	*Calidris minutilla*
Baird’s sandpiper	*Calidris bairdii*
Pectoral sandpiper	*Calidris melanotos*
Dunlin	*Calidris alpina*
Short-billed dowitcher	*Limnodromus griseus*
Long-billed dowitcher	*Limnodromus scolopaceus*
Common snipe	*Gallinago gallinago*
Wilson’s phalarope	*Phalaropus tricolor*
Red-necked phalarope	*Phalaropus lobatus*
Red phalarope	*Phalaropus fulicarius*
Pomarine jaeger	*Stercorarius pomarinus*
Parasitic jaeger	*Stercorarius parasiticus*
Bonaparte’s gull	*Chroicocephalus philadelphia*

Common Name	Scientific Name
Heermann's gull	*Larus heermanni*
Mew gull	*Larus canus*
Ring-billed gull	*Larus delawarensis*
California gull	*Larus californicus*
Herring gull	*Larus argentatus*
Thayer's gull	*Larus glaucoides*
Western gull [2]	*Larus occidentalis*
Glaucous-winged gull	*Larus glaucescens*
Glaucous gull	*Larus hyperboreus*
Caspian tern	*Hydroprogne caspia*
Royal tern	*Thalasseus maximus*
Elegant tern	*Thalasseus elegans*
Common tern	*Sterna hirundo*
Forster's tern	*Sterna forsteri*
California least tern [2]	*Sternula antillarum browni*
Common murre	*Uria aalge*
Pigeon guillemot [2]	*Cepphus columba*
Marbled murrelet	*Brachyramphus marmoratus*
Rhinoceros auklet [2]	*Cerorhinca monocerata*
Rock pigeon [2]	*Columba livia*
Band-tailed pigeon	*Patagioenas fasciata*
Mourning dove [2]	*Zenaida macroura*
Greater roadrunner [2]	*Geococcyx californianus*
Barn-owl [2]	*Tyto alba*
Western screech-owl [2]	*Megascops kennicottii*
Great horned owl [2]	*Bubo virginianus*
Western burrowing owl [2]	*Athene cunicularia hypugaea*
Long-eared owl [2]	*Asio otus*
Short-eared owl	*Asio flammeus*
Northern saw whet owl	*Aegolius acadicus*
Common poorwill [2]	*Phalaenoptilus nuttallii*

Common Name	Scientific Name
Vaux's swift	*Chaetura vauxi*
White-throated swift [2]	*Aeronautes saxatalis*
Black-chinned hummingbird [2]	*Archilochus alexandri*
Anna's hummingbird [2]	*Calypte anna*
Costa's hummingbird [2]	*Calypte costae*
Rufous hummingbird	*Selasphorus rufus*
Allen's hummingbird [2]	*Selasphorus sasin*
Belted kingfisher [2]	*Megaceryle alcyon*
Acorn woodpecker [2]	*Melanerpes formicivorus*
Red-breasted sapsucker	*Sphyrapicus ruber*
Nuttall's woodpecker [2]	*Dryobates nuttallii*
Downy woodpecker [2]	*Dryobates pubescens*
Hairy woodpecker [2]	*Dryobates villosus*
Northern flicker [2]	*Colaptes auratus*
Olive-sided flycatcher [2]	*Contopus cooperi*
Western wood-pewee [2]	*Contopus sordidulus*
Little willow flycatcher	*Empidonax traillii brewsteri*
Southwestern willow flycatcher [2]	*Empidonax traillii extimus*
Pacific-slope flycatcher [2]	*Empidonax difficilis*
Black phoebe [2]	*Sayornis nigricans*
Say's phoebe	*Sayornis saya*
Ash-throated flycatcher [2]	*Myiarchus cinerascens*
Cassin's kingbird [2]	*Tyrannus vociferans*
Western kingbird [2]	*Tyrannus verticalis*
Loggerhead shrike [2]	*Lanius ludovicianus*
Blue-headed vireo	*Vireo solitarius*
Hutton's vireo [2]	*Vireo huttoni*
Warbling vireo [2]	*Vireo gilvus*
California scrub-jay [2]	*Aphelocoma californica*
American crow [2]	*Corvus brachyrhynchos*
California horned lark [2]	*Eremophila alpestris actia*

Common Name	Scientific Name
Tree swallow [2]	*Tachycineta bicolor*
Violet-green swallow [2]	*Tachycineta thalassina*
Northern rough-winged swallow [2]	*Stelgidopteryx serripennis*
Bank swallow	*Riparia riparia*
Purple martin	*Progne subis*
Cliff swallow [2]	*Petrochelidon pyrrhonota*
Barn swallow [2]	*Hirundo rustica*
Chestnut-backed chickadee [2]	*Poecile rufescens*
Oak titmouse [2]	*Baeolophus inornatus*
Bushtit [2]	*Psaltriparus minimus*
Red-breasted nuthatch	*Sitta canadensis*
White-breasted nuthatch	*Sitta carolinensis*
Pygmy nuthatch	*Sitta pygmaea*
Brown creeper	*Certhia americana*
Rock wren [2]	*Salpinctes obsoletus*
Bewick's wren [2]	*Thryomanes bewickii*
House wren [2]	*Troglodytes aedon*
Winter wren	*Troglodytes hiemalis*
Marsh wren [2]	*Cistothorus palustris*
Golden-crowned kinglet	*Regulus satrapa*
Ruby-crowned kinglet	*Regulus calendula*
Blue-grey gnatcatcher [2]	*Polioptila caerulea*
Western bluebird [2]	*Sialia mexicana*
Swainson's thrush [2]	*Catharus ustulatus*
Hermit thrush	*Catharus guttatus*
American robin [2]	*Turdus migratorius*
Varied thrush	*Ixoreus naevius*
Wrentit [2]	*Chamaea fasciata*
Northern mockingbird [2]	*Mimus polyglottos*
California thrasher [2]	*Toxostoma redivivum*
European starling [2]	*Sturnus vulgaris*

Common Name	Scientific Name
American pipit	*Anthus rubescens*
Cedar waxwing	*Bombycilla cedrorum*
Orange-crowned warbler [2]	*Leiothlypis celata*
Nashville warbler	*Leiothlypis ruficapilla*
Yellow warbler [2]	*Dendroica petechia*
Yellow-rumped warbler	*Setophaga coronata*
Black-throated gray warbler	*Setophaga nigrescens*
Townsend’s warbler	*Setophaga townsendi*
Hermit warbler	*Setophaga occidentalis*
MacGillivray’s warbler	*Geothlypis tolmiei*
Common yellowthroat [2]	*Geothlypis trichas*
Wilson’s warbler [2]	*Cardellina pusilla*
Yellow-breasted chat [2]	*Icteria virens*
Western tanager	*Piranga ludoviciana*
Spotted towhee [2]	*Pipilo maculatus*
California towhee [2]	*Melozone crissalis*
Rufous-crowned sparrow [2]	*Aimophila ruficeps*
Black-chinned sparrow [2]	*Spizella atrogularis*
Lark sparrow [2]	*Chondestes grammacus*
Bell’s sage sparrow [2]	*Artemisiospiza belli belli*
Belding's savannah sparrow [2]	*Passerculus sandwichensis beldingi*
Grasshopper sparrow [2]	*Ammodrammus savannarum*
Fox sparrow	*Passerella iliaca*
Song sparrow [2]	*Melospiza melodia*
Lincoln’s sparrow	*Melospiza lincolnii*
Swamp sparrow	*Melospiza georgiana*
Golden-crowned sparrow	*Zonotrichia atricapilla*
White-crowned sparrow [2]	*Zonotrichia leucophrys*
Dark-eyed junco [2]	*Junco hyemalis*
Black-headed grosbeak [2]	*Pheucticus melanocephalus*
Blue grosbeak [2]	*Passerina caerulea*

Common Name	Scientific Name
Lazuli bunting [2]	*Passerina amoena*
Red-winged blackbird [2]	*Agelaius phoeniceus*
Tricolored blackbird	*Agelaius tricolor*
Western meadowlark [2]	*Sturnella neglecta*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
Brewer's blackbird [2]	*Euphagus cyanocephalus*
Brown-headed cowbird [2]	*Molothrus ater*
Hooded oriole [2]	*Icterus cucullatus*
Bullock's oriole [2]	*Icterus bullockii*
Purple finch [2]	*Haemorhous purpureus*
House finch [2]	*Haemorhous mexicanus*
Red crossbill	*Loxia curvirostra*
Pine siskin	*Spinus pinus*
Lesser goldfinch [2]	*Spinus psaltria*
Lawrence's goldfinch [2]	*Spinus lawrencei*
American goldfinch [2]	*Carduelis tristis*
House sparrow [2]	*Passer domesticus*
Important Terrestrial Invertebrates [3]	
Vernal pool fairy shrimp	*Branchinecta lynchi*
Monarch butterfly	*Danaus plexippus*
El Segundo blue butterfly	*Euphilotes battoides allyni*
Plants [4]	
Coastal sand verbena	*Abronia latifolia*
Red sand verbena	*Abronia maritima*
Beach sand verbena	*Abronia umbellata*
Golden Wattle	*Acacia pycnantha*
Box elder	*Acer negundo* var. *californicum*
Chamise	*Adenostoma fasciculatum*
Beach-bur	*Ambrosia chamissonis*
European beachgrass	*Ammophila arenaria*
Aphanisma	*Aphanisma blitoides*

Common Name	Scientific Name
Manzanita	*Arctostaphylos* sp.
La Purisima manzanita	*Arctostaphylos purissima*
Refugio manzanita	*Arctostaphylos refugioensis*
Sand mesa (shagbark) manzanita	*Arctostaphylos rudis*
Woolly-leafed manzanita	*Arctostaphylos tomentosa*
California sagebrush	*Artemisia californica*
Wild oat	*Avena* sp.
Coyote brush	*Baccharis pilularis*
Mustard	*Brassica* sp.
Brome	*Bromus* sp.
Sea rocket	*Cakile maritima*
Sedge	*Carex* sp.
Schott’s sedge	*Carex schottii*
Indian paintbrush	*Castilleja* sp.
California lilac	*Ceanothus* sp.
Buckbrush	*Ceanothus cuneatus* var. *fascicularis*
Santa Barbara ceanothus	*Ceanothus impressus*
Blue blossom	*Ceanothus thyrsiflorus*
Tranquillion Mountain ceanothus	*Cenaothus papillosus* var. *roweanus*
Straight-awned spineflower	*Chorizanthe rectispina*
La Graciosa thistle	*Cirsium scariosum* var. *loncholepis*
Surf thistle	*Cirsium rhothophilum*
Narrow-leaved iceplant	*Conicosia pugioniformis*
Pampas grass	*Cortaderia* spp.
Seaside bird’s-beak	*Cordylanthus rigidus* ssp. *littoralis*
Giant coreopsis	*Coreopsis gigantea*
Surf thistle	*Crisium rhothophilum*
Monterey cypress	*Cupressus macrocarpa*
Dune larkspur	*Delphinium parryi* ssp. *blochmaniae*
Vandenberg monkeyflower	*Diplacus vandenbergensis*
Beach spectacle-pod	*Dithyrea maritima*

Common Name	Scientific Name
Blochman’s dudleya	*Dudleya blochmaniae* ssp. *blochmaniae*
Dudleya	*Dudleya* sp.
Veldt frass	*Ehrharta* spp.
Spikerush	*Eleocharis macrostachya*
Giant rye grass	*Elymus arenarius*
Blue wildrye	*Elymus glaucus* ssp. *glaucus*
Alkali ryegrass	*Elymus triticoides*
Bush sunflower	*Encelia californica*
Coastal goldenbush	*Haplopappus ericoide*
Blochman’s leafy dasiy	*Erigeron blochmaniae*
Seaside daisy	*Erigeron glaucus*
Lompoc yerba santa	*Eriodictyon capitatum*
Dune buckwheat	*Eriogonum parvifolium*
Woolly sunflower	*Eriophyllum staechadifolium*
Filarees	*Erodium* sp.
Tasmanian bluegum	*Eucalyptus globulus*
Alkali heath	*Frankenia salina*
California goldenbush	*Ericameria ericoides*
Gaviota tarplant	*Hemizonia increscens* ssp. *villosa*
Low barley	*Hordeum depressum*
Wall barley	*Hordeum murinum* ssp. *leporinum*
Kellogg’s horkelia	*Horkelia cuneata* ssp. *sericea*
Coastal goldenbush	*Isocoma menziesii*
Rush	*Juncus* sp.
Sickle-leaved rush	*Juncus falcatus* var. *falcatus*
Brown-headed creeping rush	*Juncus phaeocephalus* var. *phaeocephalus*
Junegrass	*Koeleria macrantha*
Beach layia	*Layia carnosa*
California aster	*Lessingia filaginifolia* var. *filaginifolia*
Tanbark oak	*Notholithocarpus densiflorus*
Deerweed	*Lotus scoparius*

Common Name	Scientific Name
Lupine	*Lupinus* sp.
Chamisso's lupine	*Lupinus chamissonis*
Bush lupine	*Lupinus chamissonis*
Dunedelion	*Malacothrix incana*
California burclover	*Medicago polymorpha*
Small-flowered melic	*Melica imperfecta*
Crystalline iceplant	*Mesembryanthemum crystallinum*
Crisp monardella	*Monardella crispa*
San Luis Obispo monardella	*Monardella frutescens*
Needlegrass	*Nassella* sp.
Lemmon’s canarygrass	*Phalaris lemmonii*
Bishop pine	*Pinus muricata*
Monterey pine	*Pinus radiata*
Annual beard grass	*Polypogon monspeliensis*
Western sword fern	*Polystichum munitum*
Bracken fern	*Pteridium aquilinum* var. *pubescens*
Coast live oak	*Quercus agrifolia* var. *agrifolia*
Santa Cruz live oak	*Quercus parvula* var. *parvula*
Interior live oak	*Quercus wislizenii* var. *frutescens*
Coffeeberry	*Rhamnus californica*
Gooseberry	*Ribes divaricatum*
Gambel’s water cress	*Rorippa gambellii*
California blackberry	*Rubus ursinus*
Pickleweed	*Salicornia virginica*
Willow	*Salix* sp.
Arroyo willow	*Salix lasiolepis*
Sage	*Salvia* sp.
Black sage	*Salvia mellifera*
Hoffmann’s sanicle	*Sanicula hoffmannii*
American bulrush	*Scirpus americanus*
California bulrush	*Scirpus californicus*

Common Name	Scientific Name
Black-flowered figwort	*Scrophularia atrata*
Blochman's butterweed	*Senecio californicus*
Giant bur-reed	*Spaganium eurycarpum* ssp. *eurycarpum*
Western poison oak	*Toxicodendron diersilobum*
Borad-leaved cattail	*Typha latifolia*
Hoary nettle	*Urtica dioica* ssp. *holosericea*
California huckleberry	*Vaccinium ovatum*
Fescue	*Vulpia* sp.

Source: Table B-5 in the 2021 VSFB Integrated Natural Resources Management Plan (INRMP; USSF 2021).

[1] *Identification based on range.*
[2] *Breeding birds.*
[3] *For complete list of terrestrial arthropods on VSFB refer to Pratt 2006.*
[4] *Not an inclusive list of all plant species that occur on VSFB; only species mentioned in the 2021 INRMP are listed.*

References

Pratt, G.F, 2006. Terrestrial Arthropods of the Vandenberg Air Force Base, Lompoc, California 2004-2005 (Draft Report). Department of Entomology, University of California Riverside. 106pp. Cited in USSF 2021.

U.S. Space Force (USSF), 2021. VSFB Integrated Natural Resources Management Plan, September 2021.

Special Status Species with the Potential to Occur in the NGI Broad Ocean Area ROI

Common Name	Scientific Name	Status
Fish		
Oceanic whitetip shark	*Carcharhinus longimanus*	T
Oceanic giant manta ray	*Manta birostris*	T
Scalloped hammerhead shark	*Sphyrna lewini*	E, T [1]
Sea Turtles		
Loggerhead turtle (North Pacific Ocean DPS)	*Caretta caretta*	E
Green turtle	*Chelonia mydas*	E, T [2]
Leatherback turtle	*Dermochelys coriacea*	E
Hawksbill turtle	*Enetmochelys imbricata*	E
Olive ridley turtle	*Lepidochelys olivacea*	T [3]
Birds		
Band-rumped storm petrel	*Oceanodroma castro*	E, MBTA
Hawaiian petrel	*Pterodroma sandwichensis*	E, MBTA
Short-tailed albatross	*Phoebastria albatrus*	E, MBTA
Newell's Townsend's shearwater	*Puffinus auricularis newelli*	T, MBTA
Cetaceans		
Minke whale	*Balaenoptera acutorostrata*	MMPA
Sei whale	*Balaenoptera borealis*	E, MMPA - Depleted
Bryde's whale	*Balaenoptera edeni*	MMPA
Blue whale	*Balaenoptera musculus*	E, MMPA - Depleted
Fin whale	*Balaenoptera physalus*	E, MMPA - Depleted
Baird's beaked whale	*Berardius bairdii*	MMPA
Long-beaked common dolphin	*Delphinus capensis*	MMPA
Short-beaked common dolphin	*Delphinus delphis*	MMPA
North Pacific right whale	*Eubalaena japonica*	E, MMPA - Depleted
Pygmy killer whale	*Feresa attenuata*	MMPA
Short-finned pilot whale	*Globicephala macrorhynchus*	MMPA
Risso's dolphin	*Grampus griseus*	MMPA
Longman's beaked whale	*Indopacetus pacificus*	MMPA

Common Name	Scientific Name	Status
Pygmy sperm whale	*Kogia breviceps*	MMPA
Dwarf sperm whale	*Kogia sima*	MMPA
Fraser's dolphin	*Lagenodelphis hosei*	MMPA
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	MMPA
Northern right whale dolphin	*Lissodelphis borealis*	MMPA
Humpback whale	*Megaptera novaeangliae*	E, T, MMPA-Depleted [4]
Hubbs' beaked whale	*Mesoplodon carlhubbsi*	MMPA
Blainville's beaked whale	*Mesoplodon densirostris*	MMPA
Ginkgo-toothed beaked whale	*Mesoplodon ginkgodens*	MMPA
Perrin's beaked whale	*Mesoplodon perrini*	MMPA
Stejneger's beaked whale	*Mesoplodon stejnegeri*	MMPA
Killer whale	*Orcinus orca*	MMPA
Melon-headed whale	*Peponocephala electra*	MMPA
Dall's porpoise	*Phocoenoides dalli*	MMPA
Sperm whale	*Physeter macrocephalus*	E, MMPA - Depleted
False killer whale	*Pseudorca crassidens*	MMPA [5]
Pantropical spotted dolphin	*Stenella attenuata*	MMPA
Striped dolphin	*Stenella coeruleoalba*	MMPA
Spinner dolphin	*Stenella longirostris*	MMPA
Rough-toothed dolphin	*Steno bredanensis*	MMPA
Bottlenose dolphin	*Tursiops truncatus*	MMPA
Cuvier's beaked whale	*Ziphius cavirostris*	MMPA
Pinnipeds		
Guadalupe fur seal	*Arctocephalus townsendi*	T, MMPA - Depleted
Northern fur seal	*Callorhinus ursinus*	MMPA
Northern elephant seal	*Mirounga angustirostris*	MMPA
Hawaiian monk seal	*Neomonachus schauinslandi*	E, MMPA - Depleted
California sea lion	*Zalophus californianus*	MMPA

Source: NOAA 2023, USFWS 2023, DAF 2021, USASMDC and Teledyne Brown Engineering, Inc., 2020.
Notes: E = species or DPS present within the ROI is listed as endangered under the ESA; MBTA = species is protected under the Migratory Bird Treaty Act; MMPA = species protected under the Marine Mammal Protection Act (MMPA); MMPA - Depleted = stock is depleted throughout its range under the MMPA; T = species or distinct population segment (DPS) present within the Region of Influence (ROI) is listed as threatened under the Endangered Species Act (ESA).

[1] *Scalloped hammerheads in the ROI could be either from the ESA-endangered Eastern Pacific DPS or the ESA-threatened Indo-West Pacific DPS (Miller et al. 2013).*
[2] *Green turtles in the ROI may belong to one of four DPSs (Seminoff et al. 2015). The Central West Pacific DPS and Central South Pacific DPS are listed as endangered under the ESA and the Central North Pacific DPS and Eastern Pacific DPS are listed as threatened.*
[3] *As a species, the olive ridley turtle is listed as threatened, but the Mexican Pacific Coast nesting population is listed as endangered. Some olive ridley turtles in the ROI may be from this east Pacific Coast nesting population (NMFS and USFWS 2014).*
[4] *Individuals from up to five humpback whale DPSs may occur in the BOA ROI (Bettridge et al. 2015). The Oceania DPS and Hawaii DPS are not listed under the ESA, the Mexico DPS is listed at threatened, and the Central America DPS and Western North Pacific DPS are listed as endangered. All stocks present in the ROI, as defined under the MMPA, are listed as depleted (the Western North Pacific, Central North Pacific, and California, Oregon, and Washington stocks).*
[5] *As a species, the false killer whale is not listed under the ESA; however, the Main Hawaiian Insular DPS is listed as endangered under the ESA and depleted under the MMPA.*

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Appendix C: Air Conformity Applicability Model Scenario Calculations

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Tables

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1.0 Overview

The Air Conformity Applicability Model (ACAM) version 5.0.18a was used to perform an analysis to assess the potential air quality impacts associated with the Proposed Action. This document provides the ACAM results.

For this air quality analysis, emissions modeling was organized by location and project phase. Site preparations, testing, and deployment and operation would occur at Vandenberg Space Force Base (VSFB). Site preparations and deployment and operation would occur at Fort Greely, Alaska (FGA). The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed that ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA, the interceptors would be delivered via air transport.

This document is presented in six sections corresponding to the emissions scenarios considered for VSFB and FGA. The emissions scenarios are as follows:

- **VSFB Scenario 1:** three single-launch test events per year with air delivery of the missile transport vehicle and interceptors
- **VSFB Scenario 2:** three single-launch test events per year with ground delivery of the missile transport vehicle and interceptors
- **VSFB Scenario 3:** three dual-launch test events per year with air delivery of the missile transport vehicle and interceptors
- **VSFB Scenario 4:** three dual-launch test events per year with ground delivery of the missile transport vehicle and interceptors
- **FGA Scenario 1:** air delivery of the missile transporter
- **FGA Scenario 2:** ground delivery of the missile transporter

VSFB is in Santa Barbara County, California, which is nonattainment for the ozone (O_3) and particulate matter less than or equal to 10 microns in diameter (PM_{10}) California Ambient Air Quality Standards (CAAQS). As such, the General Conformity Rule is potentially applicable to emissions of volatile organic compounds (VOC) and nitrogen oxides (NOX) (because they are precursors of O_3) and PM_{10} that result from the Proposed Action at VSFB. Santa Barbara County is attainment or unclassified for all other criteria pollutants.

FGA is within the Southeast Fairbank Census Area, which is attainment or unclassified for all criteria pollutants. Therefore, the General Conformity Rule is not applicable to emissions of criteria pollutants from the Proposed Action at FGA.

The emission factors presented in this report are imbedded within ACAM and come from the following Department of the Air Force (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).

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: (1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; (2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); (3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; (4) deployment and operation at VSFB would occur as early as 2027; and (5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

Estimated annual emissions for each scenario are summarized in **Table 1** through **Table 12**.

Table 1. Estimated Annual Net Change in Emissions from VSFB Scenario 1

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.214	11.389	1.560	0.338	1.592	0.718	<0.001	1,444.7
2025 (testing)	0.023	7.569	0.192	0.250	0.560	0.504	<0.001	770.1
2026 (testing)	0.023	7.569	0.192	0.250	0.560	0.504	<0.001	770.2
2027 (testing and deployment)	0.037	17.652	0.343	0.584	1.306	1.175	<0.001	1,778.8
2028 and later (testing)	0.023	7.569	0.192	0.250	0.560	0.504	<0.001	770.2

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; VOC = volatile organic compound.

Table 2. Estimated Annual Net Change in Emissions from VSFB Scenario 2

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.204	1.345	1.420	0.005	0.849	0.047	<0.001	450.6
2025 (testing)	0.015	0.036	0.087	<0.001	0.003	0.001	<0.001	24.5
2026 (testing)	0.015	0.036	0.087	<0.001	0.003	0.001	<0.001	24.6
2027 (testing and deployment)	0.018	0.067	0.096	<0.001	0.005	0.002	<0.001	37.2
2028 and later (testing)	0.015	0.036	0.087	<0.001	0.003	0.001	<0.001	24.6

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; VOC = volatile organic compound.

Table 3. Estimated Annual Net Change in Emissions from VSFB Scenario 3

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.234	18.917	8.059	0.586	2.151	1.221	<0.001	2,201.2
2025 (testing)	0.033	15.131	0.305	0.501	1.119	1.007	<0.001	1,526.6
2026 (testing)	0.033	15.131	0.305	0.501	1.119	1.007	<0.001	1,526.7
2027 (testing and deployment)	0.047	25.214	0.456	0.834	1.865	1.679	<0.001	2,535.3
2028 and later (testing)	0.033	15.131	0.305	0.501	1.119	1.007	<0.001	1,526.7

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; VOC = volatile organic compound.

Table 4. Estimated Annual Net Change in Emissions from VSFB Scenario 4

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2024 (site preparations and testing)	0.207	1.374	1.428	0.005	0.850	0.048	<0.001	461.4
2025 (testing)	0.018	0.065	0.095	<0.001	0.004	0.002	<0.001	35.3
2026 (testing)	0.018	0.065	0.095	<0.001	0.004	0.002	<0.001	35.4
2027 (testing and deployment)	0.020	0.097	0.104	<0.001	0.006	0.003	<0.001	48.0
2028 and later (testing)	0.018	0.065	0.095	<0.001	0.004	0.002	<0.001	35.4

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; VOC = volatile organic compound.

Table 5. Estimated Annual Net Change in Emissions from FGA Scenario 1

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2026 (site preparations)	0.795	4.404	6.124	0.016	2.826	0.152	<0.001	1,652.9
2027 (site preparations)	0.467	2.716	3.903	0.009	1.103	0.085	<0.001	1,050.5
2028 (site preparations)	0.789	2.720	3.908	0.009	1.103	0.085	<0.001	1,052.8
2029 (deployment)	0.356	274.245	3.474	9.028	19.877	17.897	<0.001	27,288.6
20230 and later	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; VOC = volatile organic compound.

Table 6. Estimated Annual Net Change in Emissions from FGA Scenario 2

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
2026 (site preparations)	0.795	4.404	6.124	0.016	2.826	0.152	<0.001	1,652.9
2027 (site preparations)	0.467	2.716	3.903	0.009	1.103	0.085	<0.001	1,050.5
2028 (site preparations)	0.789	2.720	3.908	0.009	1.103	0.085	<0.001	1,052.8
2029 (deployment)	0.350	269.760	3.423	8.880	19.552	17.604	<0.001	26,846.7
2030 and later	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; VOC = volatile organic compound.

Estimated emissions based on activity type and project phase for each scenario are summarized in the following tables. Assumptions used for each activity are detailed in the Detailed ACAM Reports.

Table 7. Estimated Emissions by Activity for VSFB Scenario 1

Activity #	Description	Year(s)	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
1	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819	2024	0.077897	0.001786	0.553743	0.532113	0.025233	0.019570	0.000000	177.7
2	VSFB Site Preparations – Modifications for LF-23 and LF-24	2024	0.080159	0.001834	0.587026	0.558440	0.814625	0.021015	0.000000	183.8
3	VSFB Site Preparations – Modifications to Off-installation Warehouses	2024	0.030078	0.000641	0.159204	0.239155	0.005664	0.005334	0.000000	61.0
4	VSFB Testing – Delivery of Interceptors for Three Single-Launch Test Events via C-17 (LTO)	2024 - indefinite	0.001119	0.006347	0.103809	0.039904	0.032709	0.029379	0.000000	19.2
5	VSFB Testing – Delivery of Interceptors for Three Single-Launch Test Events via C-17 (intermediate)	2024 - indefinite	0.009117	0.243891	7.458040	0.072939	0.526530	0.474105	0.000000	737.1
6	VSFB Testing – Delivery of Missile Transporter via C-17 (LTO)	2024	0.000373	0.002116	0.034603	0.013301	0.010903	0.009793	0.000000	6.4
7	VSFB Testing – Delivery of Missile Transporter via C-17 (intermediate)	2024	0.003039	0.081297	2.486013	0.024313	0.175510	0.158035	0.000000	245.7
8	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819	2024 - indefinite	0.000006	0.000000	0.000074	0.000020	0.000005	0.000002	0.000000	0.0
9	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Ground Tests	2024 - indefinite	0.000013	0.000001	0.000155	0.000043	0.000009	0.000005	0.000000	0.1
10	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Flight Tests	2026 - indefinite	0.000011	0.000000	0.000128	0.000036	0.000008	0.000004	0.000000	0.1
11	VSFB Testing – Testing Personnel Requirements	2024 - indefinite	0.005748	0.000068	0.002989	0.036091	0.000338	0.000127	0.000000	6.2
12	VSFB Testing – Testing Personnel Requirements	2024 - indefinite	0.006897	0.000082	0.003587	0.043310	0.000405	0.000153	0.000000	7.5
13	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (LTO)	2027	0.001492	0.008463	0.138412	0.053206	0.043612	0.039172	0.000000	25.6
14	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (intermediate)	2027	0.012157	0.325188	9.944053	0.097252	0.702040	0.632140	0.000000	982.9
15	VSFB Deployment and Operation – Interceptors from VSFB Airfield to Buildings 1555 and 1819	2027	0.000007	0.000000	0.000082	0.000023	0.000005	0.000003	0.000000	0.0
16	VSFB Deployment and Operation – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24	2027	0.000015	0.000001	0.000171	0.000048	0.000011	0.000006	0.000000	0.1

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; tpy = tons per year; VOC = volatile organic compound.

Table 8. Estimated Emissions by Activity for VSFB Scenario 2

Activity #	Description	Year(s)	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
1	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819	2024	0.077897	0.001786	0.553743	0.532113	0.025233	0.019570	0.000000	177.7
2	VSFB Site Preparations – Modifications for LF-23 and LF-24	2024	0.080159	0.001834	0.587026	0.558440	0.814625	0.021015	0.000000	183.8
3	VSFB Site Preparations – Modifications to Off-installation Warehouses	2024	0.030078	0.000641	0.159204	0.239155	0.005664	0.005334	0.000000	61.0
4	VSFB Testing – Delivery of Interceptors for Three Single Launch Test Events via Ground Transport	2024 - indefinite	0.002476	0.000098	0.028745	0.007865	0.001745	0.000943	0.000000	10.7
5	VSFB Testing – Delivery of Missile Transporter via Ground Transport	2024	0.000825	0.000033	0.009582	0.002622	0.000582	0.000314	0.000000	3.6
6	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819	2024 - indefinite	0.000006	0.000000	0.000074	0.000020	0.000005	0.000002	0.000000	0.0
7	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Ground Tests	2024 - indefinite	0.000013	0.000001	0.000155	0.000043	0.000009	0.000005	0.000000	0.1
8	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Flight Tests	2026 - indefinite	0.000011	0.000000	0.000128	0.000036	0.000008	0.000004	0.000000	0.1
9	VSFB Testing – Testing Personnel Requirements (2024)	2024 - indefinite	0.005748	0.000068	0.002989	0.036091	0.000338	0.000127	0.000000	6.2
10	VSFB Testing – Testing Personnel Requirements	2024 - indefinite	0.006897	0.000082	0.003587	0.043310	0.000405	0.000153	0.000000	7.5
11	VSFB Deployment and Operation – Delivery of Four Interceptors via Ground Transport	2027	0.002758	0.000113	0.031611	0.008892	0.001989	0.001088	0.000000	12.5
12	VSFB Deployment and Operation – Interceptors from Buildings 1555 and1819 to the Silos at LF-23 and LF-24	2027	0.000015	0.000001	0.000171	0.000048	0.000011	0.000006	0.000000	0.1

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; tpy =tons per year; VOC = volatile organic compound.

Table 9. Estimated Emissions by Activity for VSFB Scenario 3

Activity #	Description	Year(s)	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
1	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819	2024	0.077897	0.001786	0.553743	0.532113	0.025233	0.019570	0.000000	177.7
2	VSFB Site Preparations – Modifications for LF-23 and LF-24	2024	0.080159	0.001834	0.587026	0.558440	0.814625	0.021015	0.000000	183.8
3	VSFB Site Preparations – Modifications to Off-installation Warehouses	2024	0.030078	0.000641	0.159204	0.239155	0.005664	0.005334	0.000000	61.0
4	VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via C-17 (LTO)	2024 - indefinite	0.002238	0.012694	0.207618	0.079808	0.065418	0.058758	0.000000	38.4
5	VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via C-17 (intermediate)	2024 - indefinite	0.018235	0.487781	14.916079	0.145879	1.053061	0.948210	0.000000	1,474.3
6	VSFB Testing – Delivery of Missile Transporter via C-17 (LTO)	2024	0.009793	0.000000	0.000000	6.400000	0.010903	0.009793	0.000000	6.4
7	VSFB Testing – Delivery of Missile Transporter via C-17 (intermediate)	2024	0.003039	0.081297	2.486013	0.024313	0.175510	0.158035	0.000000	245.7
8	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819	2024 - indefinite	0.000013	0.000001	0.000149	0.000041	0.000009	0.000005	0.000000	0.1
9	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Ground Tests	2024 - indefinite	0.000027	0.000001	0.000311	0.000085	0.000019	0.000010	0.000000	0.1
10	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Flight Tests	2026 - indefinite	0.000022	0.000001	0.000256	0.000072	0.000016	0.000009	0.000000	0.1
11	VSFB Testing – Testing Personnel Requirements	2024 - indefinite	0.005748	0.000068	0.002989	0.036091	0.000338	0.000127	0.000000	6.2
12	VSFB Testing – Testing Personnel Requirements	2024 - indefinite	0.006897	0.000082	0.003587	0.043310	0.000405	0.000153	0.000000	7.5
13	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (LTO)	2027	0.001492	0.008463	0.138412	0.053206	0.043612	0.039172	0.000000	25.6
14	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (intermediate)	2027	0.012157	0.325188	9.944053	0.097252	0.702040	0.632140	0.000000	982.9
15	VSFB Deployment and Operation – Interceptors from VSFB Airfield to Buildings 1555 and 1819	2027	0.000007	0.000000	0.000082	0.000023	0.000005	0.000003	0.000000	0.0
16	VSFB Deployment and Operation – Interceptors from Buildings 1555 and1819 to the Silos at LF-23 and LF-24	2027	0.000015	0.000001	0.000171	0.000048	0.000011	0.000006	0.000000	0.1

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter, SO_X = sulfur oxides; tpy = tons per year; VOC = volatile organic compound.

Table 10. Estimated Emissions by Activity for VSFB Scenario 4

Activity #	Description	Year(s)	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
1	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819	2024	0.077897	0.001786	0.553743	0.532113	0.025233	0.019570	0.000000	177.7
2	VSFB Site Preparations – Modifications for LF-23 and LF-24	2024	0.080159	0.001834	0.587026	0.558440	0.814625	0.021015	0.000000	183.8
3	VSFB Site Preparations – Modifications to Off-installation Warehouses	2024	0.030078	0.000641	0.159204	0.239155	0.005664	0.005334	0.000000	61.0
4	VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via Ground Transport	2024 - indefinite	0.004953	0.000197	0.057490	0.015730	0.003489	0.001885	0.000000	21.4
5	VSFB Testing – Delivery of Missile Transporter via Ground Transport	2024	0.000825	0.000033	0.009582	0.002622	0.000582	0.000314	0.000000	3.6
6	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819	2024 - indefinite	0.000013	0.000001	0.000149	0.000041	0.000009	0.000005	0.000000	0.1
7	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Ground Tests	2024 - indefinite	0.000027	0.000001	0.000311	0.000085	0.000019	0.000010	0.000000	0.1
8	VSFB Testing – Interceptors from Buildings 1555 and 1819 to the Silos at LF-23 and LF-24 for Flight Tests	2026 - indefinite	0.000022	0.000001	0.000256	0.000072	0.000016	0.000009	0.000000	0.1
9	VSFB Testing – Testing Personnel Requirements (2024)	2024 - indefinite	0.005748	0.000068	0.002989	0.036091	0.000338	0.000127	0.000000	6.2
10	VSFB Testing – Testing Personnel Requirements	2024 - indefinite	0.006897	0.000082	0.003587	0.043310	0.000405	0.000153	0.000000	7.5
11	VSFB Deployment and Operation – Delivery of Four Interceptors via Ground Transport	2027	0.002758	0.000113	0.031611	0.008892	0.001989	0.001088	0.000000	12.5
12	VSFB Deployment and Operation – Interceptors from Buildings 1555 and1819 to the Silos at LF-23 and LF-24	2027	0.000015	0.000001	0.000171	0.000048	0.000011	0.000006	0.000000	0.1

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; tpy = tons per year; VOC = volatile organic compound.

Table 11. Estimated Emissions by Activity for FGA Scenario 1

Activity #	Description	Year(s)	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
1	FGA Site Preparations – Modify 60 GBI Silos (2026)	2026	0.237324	0.004530	1.558478	1.804566	1.066854	0.049532	0.000000	559.8
2	FGA Site Preparations – Modify 60 GBI Silos (2027)	2027	0.237324	0.004530	1.558478	1.804566	1.066854	0.049532	0.000000	559.8
3	FGA Site Preparations – Modify 60 GBI Silos (2027)	2028	0.237324	0.004530	1.558478	1.804566	1.066854	0.049532	0.000000	559.8
4	FGA Site Preparations – Modifications for Building 663	2026	0.056898	0.001191	0.279319	0.518535	0.008819	0.008806	0.000000	117.6
5	FGA Site Preparations – Construct New Missile Assembly Building	2026-2028	0.402193	0.003765	0.966602	1.499230	1.152255	0.033015	0.000000	384.9
6	FGA Site Preparations – Construct New Missile Assembly Building (2028 construction phase only)	2028	0.059277	0.001264	0.324999	0.545987	0.009569	0.009483	0.000000	140.8
7	FGA Site Preparations – Construct New KV Oxidizer Storage Facility	2026-2028	0.193623	0.003687	0.918071	1.467119	0.091998	0.032294	0.000000	360.1
8	FGA Site Preparations – Construct New KV Oxidizer Storage Facility (2028 construction phase only)	2028	0.056754	0.001186	0.276567	0.516881	0.008774	0.008765	0.000000	116.2
9	FGA Site Preparations – Construct New KV Fuel Storage Facility	2026-2028	0.193623	0.003687	0.918071	1.467119	0.091998	0.032294	0.000000	360.1
10	FGA Site Preparations – Construct New KV Fuel Storage Facility (2028 construction phase only)	2028	0.056754	0.001186	0.276567	0.516881	0.008774	0.008765	0.000000	116.2
11	FGA Site Preparations – Construct Two New Interceptor Storage Facilities	2026-2028	0.263351	0.003691	0.920534	1.468599	0.450165	0.032331	0.000000	361.3
12	FGA Site Preparations – Construct Two Interceptor Storage Facilities (2028 construction phase only)	2028	0.057098	0.001197	0.283172	0.520850	0.008882	0.008863	0.000000	119.6
13	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (LTO)	2029	0.022379	0.126938	2.076180	0.798083	0.654175	0.587580	0.000000	384.2
14	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (intermediate)	2029	0.327228	8.753336	267.672111	2.617820	18.897389	17.015831	0.000000	26,456.3
15	FGA Deployment and Operation – Delivery of Missile Transporter via C-17 (LTO)	2029	0.000373	0.002116	0.034603	0.013301	0.010903	0.009793	0.000000	6.4
16	FGA Deployment and Operation – Delivery of Missile Transporter via C-17 (intermediate)	2029	0.005454	0.145889	4.461202	0.043630	0.314956	0.283597	0.000000	440.9
17	FGA Deployment and Operation – Interceptors from the FGA Airfield to the Missile Assembly Building	2029	0.000052	0.000002	0.000991	0.000595	0.000016	0.000015	0.000000	0.5
18	FGA Deployment and Operation – Interceptors from the Missile Assembly Building to the Silos	2029	0.000017	0.000001	0.000330	0.000198	0.000005	0.000005	0.000000	0.2

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; tpy = tons per year; VOC = volatile organic compound.

Table 12. Estimated Emissions by Activity for FGA Scenario 2

Activity #	Description	Year(s)	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Pb (tpy)	CO_2e (tpy)
1	FGA Site Preparations – Modify 60 GBI Silos (2026)	2026	0.237324	0.004530	1.558478	1.804566	1.066854	0.049532	0.000000	559.8
	FGA Site Preparations – Modify 60 GBI Silos (2027)	2027	0.237324	0.004530	1.558478	1.804566	1.066854	0.049532	0.000000	559.8
	FGA Site Preparations – Modify 60 GBI Silos (2027)	2028	0.237324	0.004530	1.558478	1.804566	1.066854	0.049532	0.000000	559.8
	FGA Site Preparations – Modifications for Building 663	2026	0.056898	0.001191	0.279319	0.518535	0.008819	0.008806	0.000000	117.6
	FGA Site Preparations – Construct New Missile Assembly Building	2026-2028	0.402193	0.003765	0.966602	1.499230	1.152255	0.033015	0.000000	384.9
	FGA Site Preparations – Construct New Missile Assembly Building (2028 construction phase only)	2028	0.059277	0.001264	0.324999	0.545987	0.009569	0.009483	0.000000	140.8
	FGA Site Preparations – Construct New KV Oxidizer Storage Facility	2026-2028	0.193623	0.003687	0.918071	1.467119	0.091998	0.032294	0.000000	360.1
	FGA Site Preparations – Construct New KV Oxidizer Storage Facility (2028 construction phase only)	2028	0.056754	0.001186	0.276567	0.516881	0.008774	0.008765	0.000000	116.2
	FGA Site Preparations – Construct New KV Fuel Storage Facility	2026-2028	0.193623	0.003687	0.918071	1.467119	0.091998	0.032294	0.000000	360.1
	FGA Site Preparations – Construct New KV Fuel Storage Facility (2028 construction phase only)	2028	0.056754	0.001186	0.276567	0.516881	0.008774	0.008765	0.000000	116.2
	FGA Site Preparations – Construct Two New Interceptor Storage Facilities	2026-2028	0.263351	0.003691	0.920534	1.468599	0.450165	0.032331	0.000000	361.3
	FGA Site Preparations – Construct Two Interceptor Storage Facilities (2028 construction phase only)	2028	0.057098	0.001197	0.283172	0.520850	0.008882	0.008863	0.000000	119.6
	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (LTO)	2029	0.022379	0.126938	2.076180	0.798083	0.654175	0.587580	0.000000	384.2
	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (intermediate)	2029	0.327228	8.753336	267.672111	2.617820	18.897389	17.015831	0.000000	26,456.3
	FGA Deployment and Operation – Delivery of Missile Transporter via Ground Transport	2029	0.000559	0.000017	0.010732	0.006450	0.000176	0.000159	0.000000	5.4
	FGA Deployment and Operation – Interceptors from the FGA Airfield to the Missile Assembly Building	2029	0.000052	0.000002	0.000991	0.000595	0.000016	0.000015	0.000000	0.5
	FGA Deployment and Operation – Interceptors from the Missile Assembly Building to the Silos	2029	0.000017	0.000001	0.000330	0.000198	0.000005	0.000005	0.000000	0.2

Notes: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxides; Pb = lead; PM_{10} = particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter; SO_X = sulfur oxides; tpy = tons per year; VOC = volatile organic compound.

2.0 Social Cost of Greenhouse Gases Calculations

The social cost of GHGs was calculated for the Proposed Action. The “social cost of GHGs” is an estimate of the monetized damages associated with incremental increases in GHG emissions, such as reduced agricultural productivity, human health effects, property damage from increased flood risk, and the value of ecosystem services. The social costs of the three primary GHGs (i.e., carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) for the years in which the Proposed Action would occur and at both the 5 percent and 2.5 percent discount rates are shown in **Table 13**. Estimated annual GHG emissions for the Proposed Action are shown in **Table 14**.

Table 13. Social Cost of GHG ($ per metric ton) for Years 2024 through 2030

GHG	2024 5%	2024 2.5%	2025 5%	2025 2.5%	2026 5%	2026 2.5%	2027 5%	2027 2.5%	2028 5%	2028 2.5%	2029 5%	2029 2.5%	2030 5%	2030 2.5%
CO_2	16	82	17	83	17	84	18	59	18	60	19	61	19	62
CH_4	770	2,200	800	2,200	830	2,300	860	2,300	880	2,400	910	2,500	940	2,500
N_2O	6,600	29,000	6,800	30,000	7,000	30,000	7,200	31,000	7,400	32,000	7,600	32,000	7,800	33,000

Source: Interagency Working Group on Social Cost of Greenhouse Gases, United States Government (IWG-SCGHG). 2021. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. February 26, 2021.

Table 14. Estimated Annual Net GHG Emissions from the Proposed Action

Year	CO2e (tons per year)	CO2e (metric tons per year)
VSFB Scenario 1		
2024	1,444.7	1,310.6
2025	770.1	698.6
2026	770.2	698.7
2027	1,778.8	1,613.7
2028 and later years	770.2	698.7
VSFB Scenario 2		
2024	450.6	408.8
2025	24.5	22.2
2026	24.6	22.3
207	37.2	33.7
2028 and later years	24.6	22.3
VSFB Scenario 3		
2024	2,201.2	1,996.9
2025	1,526.6	1,384.9

Year	CO2e (tons per year)	CO2e (metric tons per year)
2026	1,526.7	1,385.0
2027	2,535.3	2,300.0
2028 and later years	1,526.7	1,385.0
VSFB Scenario 4		
2024	461.4	418.6
2025	35.3	32.0
2026	35.4	32.1
2027	48.0	43.5
2028 and later years	35.4	32.1
FGA Scenario 1		
2026	1,652.9	1499.5
2027	1,050.5	953.0
2028	1,052.8	955.1
2029	27,288.6	24,755.8
FGA Scenario 2		
2026	1,652.9	1499.5
2027	1,050.5	953.0
2028	1,052.8	955.1
2029	26,846.7	24,354.9

The annual social cost of GHGs was calculated for the Proposed Action for the years 2024 through 2028 for activities at VSFB and for the years 2026 through 2028 for activities at FGA. Testing at VSFB and associated CO_2e emissions (i.e., 2028 and later years) would continue indefinitely. No long-term operations were modeled for FGA, and it is assumed that CO_2e emissions at FGA would cease following NGI employment, which was assumed to occur in 2019. To calculate the social cost of GHGs, CO_2e emissions were broken down using the following distribution assumption: 99.67 percent CO_2, 0.10 percent CH_4, and 0.23 percent N_2O.[1]

CO_2e is a representation GHG emissions relative to a reference gas, CO_2. It is calculated by adding GHGs that have been multiplied by their global warming potential (GWP). CO_2 has a GWP equal to 1, while the GWP of CH_4 is 25 and the GWP of N_2O is 298. Based on these assumptions, the following equation was used to calculate the social cost of GHGs:

$$SC = SCCO_2((CO_2e*0.9967)/1) + SCCH_4((CO_2e*0.001)/25) + SCN_2O((CO_2e*0.0023)/298)$$

[1] Data Source: Emissions Factors for Greenhouse Gas Inventories (modified 12 September 2023). Available online at: https://www.epa.gov/system/files/documents/2023-03/ghg_emission_factors_hub.pdf

Where:

- SC = social cost of GHGs ($)
- $SCCO_2$ = social cost of CO_2 ($ per metric ton)
- CO_2e = equivalent emissions of CO_2 (metric tons)
- 0.9967 = percent of CO_2e that is CO_2
- 1 = GWP of CO_2
- $SCCH_4$= social cost of CH_4 ($ per metric ton)
- 0.001 = percent of CO_2e that is CH_4
- 25 = GWP of CH_4
- SCN_2O = social cost of N_2O ($ per metric ton)
- 0.0023 = percent of CO_2e that is N_2O
- 298 = GWP of N_2O

Table 15 shows the social cost of GHGs that were calculated for the Proposed Action by year and emissions scenario.

Table 15. Social Cost (in dollars) of GHGs for the Proposed Action by Year

Year	CO_2e (metric tons per year)	5% discount rate	2.5% discount rate
VSFB Scenario 1			
2024	1,310.6	21,007.53	107,523.23
2025	698.6	11,896.03	58,015.69
2026	698.7	11,899.65	58,723.18
2027	1,613.7	29,095.93	95,428.67
2028 and later years	698.7	12,599.60	42,023.30
	VSFB Scenario 1 Total	**86,498.73**	**361,714.06**
VSFB Scenario 2			
2024	408.8	6,552.63	33,538.45
2025	22.2	378.03	1,843.61
2026	22.3	379.79	1,874.23
2027	33.7	607.63	1,992.90
2028 and later years	22.3	402.13	1,341.23
	VSFB Scenario 2 Total	**8,320.22**	**40,590.43**
VSFB Scenario 3			
2024	1,996.9	32,008.19	163,828.12
2025	1,384.9	23,582.61	115,009.91
2026	1,385.0	23,588.11	116,404.19

Year	CO_2e (metric tons per year)	5% discount rate	2.5% discount rate
2027	2,300.0	41,470.31	136,014.09
2028 and later years	1,385.0	24,975.59	83,300.80
	VSFB Scenario 3 Total	**145,624.81**	**614,557.11**
VSFB Scenario 4			
2024	418.6	6,709.71	34,342.46
2025	32.0	544.91	2,657.46
2026	32.1	546.70	2,697.89
2027	43.5	784.33	2,572.44
2028 and later years	32.1	578.86	1,930.65
	VSFB Scenario 4 Total	**9,164.51**	**44,200.90**
FGA Scenario 1			
2026	1499.5	25,538.17	126,027.49
2027	953.0	17,183.13	56,357.14
2028	955.1	17,223.24	57,444.47
2029	2,4755.8	471,161.24	1,513,710.22
	FGA Scenario 1 Total	**531,105.79**	**1,753,539.33**
FGA Scenario 2			
2026	1499.5	25,538.17	126,027.49
2027	953.0	17,183.13	56,357.14
2028	955.1	17,223.24	57,444.47
2029	2,4354.9	463,531.17	1,489,196.92
	FGA Scenario 2 Total	**523,475.71**	**1,729,026.02**

3.0 VSFB Scenario 1 (Three Single-Launch Test Events per Year with Air Delivery of the Missile Transport Vehicle and Interceptors)

This section includes the following:

- VSFB Scenario 1 ACAM Report
- VSFB Scenario 2 ACAM Detail Report

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

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

a. Action Location:
Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

c. Project Number/s (if applicable): VSFB Scenario 1 (Three Single-Launch Test Events per Year with Air Delivery of the Missile Transport Vehicle and Interceptors)

d. Projected Action Start Date: 1 / 2024

e. Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

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

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

f. Point of Contact:

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

2. Air Impact Analysis:

Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.214	100	
NOx	11.389	100	
CO	1.560	250	
SOx	0.338	250	
PM 10	1.592	250	
PM 2.5	0.718	250	

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
Pb	0.000	25	No
NH3	0.009	250	
CO2e	1444.8		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.017	100	
NOx	7.565	100	
CO	0.156	250	
SOx	0.250	250	
PM 10	0.560	250	
PM 2.5	0.504	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	763.9		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.017	100	
NOx	7.566	100	
CO	0.156	250	
SOx	0.250	250	
PM 10	0.560	250	
PM 2.5	0.504	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	763.9		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.031	100	
NOx	17.648	100	
CO	0.307	250	
SOx	0.584	250	
PM 10	1.305	250	
PM 2.5	1.175	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	1772.4		

2028 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.017	100	
NOx	7.565	100	
CO	0.156	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
SOx	0.250	250	
PM 10	0.560	250	
PM 2.5	0.504	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	763.9		

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

Carolyn Hein, Contractor

11/3/2023
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

- Project Number/s (if applicable): VSFB Scenario 1 (Three Single-Launch Test Events per Year with Air Delivery of the Missile Transport Vehicle and Interceptors)

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
The purpose of the Proposed Action is to develop a more innovative interceptor capable of providing increased protection for the United States (U.S.) from the emerging global threat of intercontinental ballistic missile attacks. The Ground-Based Midcourse Defense (GMD) system has become a capable and credible defense for today's threat, and the Proposed Action, as part of the GMD system, is needed to enable the U.S. to defend the homeland and defeat future threat advances into the 2030s and beyond.

- Action Description:
The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The

analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

- Point of Contact

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

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819
3.	Construction / Demolition	VSFB Site Preparations – Modifications for LF-23 and LF-24
4.	Construction / Demolition	VSFB Site Preparations – Modifications to Off-installation Warehouses
5.	Aircraft	VSFB Testing – Delivery of Interceptors for Three Single-Launch Test Events via C-17 (LTO)
6.	Aircraft	VSFB Testing – Delivery of Interceptors for Three Single-Launch Test Events via C-17 (intermediate)
7.	Aircraft	VSFB Testing – Delivery of Missile Transporter via C-17 (LTO)
8.	Aircraft	VSFB Testing – Delivery of Missile Transporter via C-17 (intermediate)
9.	Construction / Demolition	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819
10.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Ground Tests
11.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Flight Tests
12.	Personnel	VSFB Testing – Testing Personnel Requirements
13.	Personnel	VSFB Testing – Testing Personnel Requirements
14.	Aircraft	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (LTO)
15.	Aircraft	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (intermediate)
16.	Construction / Demolition	VSFB Deployment and Operation – Interceptors from VSFB Airfield to Buildings 1555 and 1819
17.	Construction / Demolition	VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23,LF-24

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

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Activity Title: VSFB Site Preparations – Modify Existing Buildings 1555 and 1819

- Activity Description:
It was assumed renovation of Buildings 1555 and 1819 would occur over a 3-month period from October 2024 through December 2024.

It was assumed 25 percent of the total square footage of the buildings (Building 1555 = 31,000 SF; Building 1819 = 60,250 SF; total = 91,250 SF) would be construction to equate the renovations (91,250 SF *0.25 = 22,812.5 SF).

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.077897
SO_x	0.001786
NO_x	0.553743
CO	0.532113
PM 10	0.025233

Pollutant	Total Emissions (TONs)
PM 2.5	0.019570
Pb	0.000000
NH_3	0.003560
CO_2e	177.7

2.1 Building Construction Phase

2.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

2.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 91250
Height of Building (ft): 60
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

2.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

2.1.4 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

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Site Preparations – Modifications for LF-23 and LF-24

- Activity Description:
It was assumed modification of LF-23 and LF-24 would occur over a 3-month period from October 2024 through December 2024.

It was assumed the entire concrete launch pad area would be replaced and reinforced. Demolition of existing concrete would be required for each launch facility, at an estimated 22,250 SF for LF-23 and 40,250 SF for LF-24 (total = 62,500 SF). To equate the maximum potential for emissions, depth of demolition was assumed to be 60 feet. Demolition would begin in October 2024 and last approximately 1 month.

Construction for the reinforced concrete pads at LF-23 and LF-24 would occur on a total of 62,500 SF. Construction would begin in November 2024 and last approximately 2 months.

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.080159
SO_x	0.001834
NO_x	0.587026
CO	0.558440
PM 10	0.814625

Pollutant	Total Emissions (TONs)
PM 2.5	0.021015
Pb	0.000000
NH_3	0.003819
CO_2e	183.8

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

3.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 62500
Height of Building to be demolished (ft): 60

- Default Settings Used: Yes

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- 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

3.1.3 Demolition Phase Emission Factor(s)

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

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 11
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 2
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 62500
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0085	0.0001	0.0534	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

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)

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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} = 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

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Site Preparations – Modifications to Off-installation Warehouses

- Activity Description:
It was assumed 25 percent of the total square footage of the buildings (5,000 SF each; 10,000 SF total) would be construction to equate the renovations (10,000 SF *0.25 = 2,500 SF). It was assumed renovation of the two off-installation warehouses (5,000 SF each; 10,000 SF total) would occur over a 3-month period from October 2024 through December 2024.

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.030078
SO_x	0.000641
NO_x	0.159204
CO	0.239155
PM 10	0.005664

Pollutant	Total Emissions (TONs)
PM 2.5	0.005334
Pb	0.000000
NH_3	0.000332
CO_2e	61.0

4.1 Building Construction Phase

4.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

4.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 10000
Height of Building (ft): 25
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

4.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

4.1.4 Building Construction Phase Formula(s)

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- 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Interceptors for Three Single-Launch Test Events via C-17 (LTO)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 3 total flights annually for delivery of the interceptors for three single launch tests.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.001119
SO_x	0.006347
NO_x	0.103809
CO	0.039904
PM 10	0.032709

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.029379
Pb	0.000000
NH_3	0.000000
CO_2e	19.2

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

Pollutant	Emissions Per Year (TONs)
VOC	0.001119
SO_x	0.006347
NO_x	0.103809
CO	0.039904
PM 10	0.032709

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.029379
Pb	0.000000
NH_3	0.000000
CO_2e	19.2

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

5.2.2 Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 3
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 15.9
Approach [Approach] (mins): 5.1
Climb Out [Intermediate] (mins): 1.2
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year

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

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

- Aircraft Emissions for Trim per Year

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

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

5.4 Auxiliary Power Unit (APU)

5.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

5.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Interceptors for Three Single-Launch Test Events via C-17 (intermediate)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 3 total flights annually for delivery of the interceptors for three single launch tests. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.009117
SO_x	0.243891
NO_x	7.458040

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.474105
Pb	0.000000
NH_3	0.000000

Pollutant	Emissions Per Year (TONs)
CO	0.072939
PM 10	0.526530

Pollutant	Emissions Per Year (TONs)
CO_2e	737.1

- Activity Emissions [Test Cell part]:

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_2e	0.0

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

6.2.2 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	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 3
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 219
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0

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

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Missile Transporter via C-17 (LTO)

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct one flight for delivery of the missile transporter. Only one missile transporter would need to be delivered during the testing phase. For the air transport scenario, the missile transporter would not be delivered back to Courtland, Alabama. The missile transporter would remain at VSFB for the duration of the testing, and deployment and operation phases.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000373
SO_x	0.002116
NO_x	0.034603
CO	0.013301
PM 10	0.010903

Pollutant	Total Emissions (TONs)
PM 2.5	0.009793
Pb	0.000000
NH_3	0.000000
CO_2e	6.4

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

Pollutant	Total Emissions (TONs)
VOC	0.000373
SO_x	0.002116
NO_x	0.034603
CO	0.013301
PM 10	0.010903

Pollutant	Total Emissions (TONs)
PM 2.5	0.009793
Pb	0.000000
NH_3	0.000000
CO_2e	6.4

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

7.2.2 Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 15.9
Approach [Approach] (mins): 5.1
Climb Out [Intermediate] (mins): 1.2
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

7.4 Auxiliary Power Unit (APU)

7.4.1 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	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

7.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Missile Transporter via C-17 (intermediate)

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct one flight for delivery of the missile transporter. Only one missile transporter would need to be delivered during the testing phase. For the air transport scenario, the missile transporter would not be delivered back to Courtland, Alabama. The missile transporter would remain at VSFB for the duration of the testing, and deployment and operation phases.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.003039
SO_x	0.081297

Pollutant	Total Emissions (TONs)
PM 2.5	0.158035
Pb	0.000000

Pollutant	Total Emissions (TONs)
NO_x	2.486013
CO	0.024313
PM 10	0.175510

Pollutant	Total Emissions (TONs)
NH_3	0.000000
CO_2e	245.7

- Activity Emissions [Test Cell part]:

Pollutant	Total Emissions (TONs)
VOC	0.000000
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

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_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 219
Takeoff [Military] (mins): 0

Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

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

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819

- Activity Description:
The interceptors would be transferred from the VSFB airfield to Building 1555 or Building 1819 via the missile transporter for assembly, integration, and checkout. The average distance between the airfield and both buildings was used for the analysis (distance between the airfield and Building 1555 = 4.5 miles; distance between the airfield and Building 1819 = 6.5 miles; average distance = 5.5 miles). It was assumed 3 single-launch flight and 3 single-launch ground tests would occur annually and flight tests would use the same interceptors used for ground tests. Therefore, only 3 interceptors would be delivered from the airfield to Buildings 1555 and 1819 for a total roundtrip distance of 33 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000006
SO_x	0.000000
NO_x	0.000074
CO	0.000020
PM 10	0.000005

Pollutant	Total Emissions (TONs)
PM 2.5	0.000002
Pb	0.000000
NH_3	0.000001
CO_2e	0.0

9.1 Site Grading Phase

9.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

9.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 33

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

9.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

9.1.4 Site Grading Phase Formula(s)

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

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

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

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

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Ground Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). It was assumed 3 single-launch ground tests would occur annually. Therefore, a total of 3 interceptors would be delivered for a roundtrip distance of 69 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)
VOC	0.000013	PM 2.5	0.000005
SO_x	0.000001	Pb	0.000000
NO_x	0.000155	NH_3	0.000003
CO	0.000043	CO_2e	0.1
PM 10	0.000009		

10.1 Site Grading Phase

10.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

10.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 69

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

10.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

10.1.4 Site Grading Phase Formula(s)

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

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

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

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

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Flight Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). For 3 single-launch flight tests, a total of 3 interceptors would be delivered from the buildings for a total roundtrip distance of 69 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000011
SO_x	0.000000
NO_x	0.000128
CO	0.000036
PM 10	0.000008

Pollutant	Total Emissions (TONs)
PM 2.5	0.000004
Pb	0.000000
NH_3	0.000003
CO_2e	0.1

11.1 Site Grading Phase

11.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

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

11.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 69

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

11.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

11.1.4 Site Grading Phase Formula(s)

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

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

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

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

12. Personnel

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements

- Activity Description:
Approximately 20 personnel would be on site during preparation for the test launch, which would occur two weeks prior to a launch, and through the launch. For 3 annual test launches, it was conservatively assumed 20 additional personnel would be present for a total of 2 months annually. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 2
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005748
SO_x	0.000068
NO_x	0.002989
CO	0.036091
PM 10	0.000338

Pollutant	Total Emissions (TONs)
PM 2.5	0.000127
Pb	0.000000
NH_3	0.000510
CO_2e	6.2

12.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 20
Civilian Personnel: 0

Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: Yes

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

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

12.3 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

12.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

12.5 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

13. Personnel

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements

- Activity Description:
A maximum of 4 additional personnel would be at VSFB throughout the testing campaign, which was estimated to start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.006897
SO_x	0.000082
NO_x	0.003587
CO	0.043310
PM 10	0.000405

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.000153
Pb	0.000000
NH_3	0.000612
CO_2e	7.5

13.2 Personnel Assumptions

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

- Default Settings Used: Yes

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

- Personnel Work Schedule
Active Duty Personnel: 5 Days Per Week (default)

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

13.3 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

13.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

13.5 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

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (LTO)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 4 total flights for delivery of the interceptors.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001492
SO_x	0.008463
NO_x	0.138412
CO	0.053206
PM 10	0.043612

Pollutant	Total Emissions (TONs)
PM 2.5	0.039172
Pb	0.000000
NH_3	0.000000
CO_2e	25.6

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

Pollutant	Total Emissions (TONs)
VOC	0.001492
SO_x	0.008463
NO_x	0.138412
CO	0.053206
PM 10	0.043612

Pollutant	Total Emissions (TONs)
PM 2.5	0.039172
Pb	0.000000
NH_3	0.000000
CO_2e	25.6

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-100
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Original Aircraft Name:
Original Engine Name:

14.2.2 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	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 4
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 15.9
Approach [Approach] (mins): 5.1
Climb Out [Intermediate] (mins): 1.2
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0

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

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

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

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

14.4 Auxiliary Power Unit (APU)

14.4.1 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	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

14.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (intermediate)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 4 total flights for delivery of the interceptors.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.012157
SO_x	0.325188
NO_x	9.944053
CO	0.097252
PM 10	0.702040

Pollutant	Total Emissions (TONs)
PM 2.5	0.632140
Pb	0.000000
NH_3	0.000000
CO_2e	982.9

- Activity Emissions [Test Cell part]:

Pollutant	Total Emissions (TONs)
VOC	0.000000
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

15.2.2 Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 4
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 219
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

16. Construction / Demolition

16.1 General Information & Timeline Assumptions

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: VSFB Deployment and Operation – Interceptors from VSFB Airfield to Buildings 1555 and 1819

- Activity Description:
The interceptors would be transferred from the VSFB airfield to Building 1555 or Building 1819 via the missile transporter for assembly, integration, and checkout. The average distance between the airfield and both buildings was used for the analysis (distance between the airfield and Building 1555 = 4.5 miles; distance between the airfield and Building 1819 = 6.5 miles; average distance = 5.5 miles). The missile transporter would return to the airfield after all deliveries are complete. For delivery of 4 interceptors, the total roundtrip distance was estimated to be 44 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000007
SO_x	0.000000
NO_x	0.000082
CO	0.000023
PM 10	0.000005

Pollutant	Total Emissions (TONs)
PM 2.5	0.000003
Pb	0.000000
NH_3	0.000002
CO_2e	0.0

16.1 Site Grading Phase

16.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

16.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 44

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

16.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

16.1.4 Site Grading Phase Formula(s)

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

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

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

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

17. Construction / Demolition

17.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23,LF-24

- Activity Description:
The interceptors would be transferred from the VSFB airfield to the silos at LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). The missile transporter would return to the missile assembly building after all deliveries are complete. For delivery of 4 interceptors, the total roundtrip distance was estimated to be 92 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False

End Month: 1
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000015
SO_x	0.000001
NO_x	0.000171
CO	0.000048
PM 10	0.000011

Pollutant	Total Emissions (TONs)
PM 2.5	0.000006
Pb	0.000000
NH_3	0.000003
CO_2e	0.1

17.1 Site Grading Phase

17.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

17.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 92

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

17.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

17.1.4 Site Grading Phase Formula(s)

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

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

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

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

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

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

4.0 VSFB Scenario 2 (Three Single-Launch Test Events per Year with Ground Delivery of the Missile Transport Vehicle and Interceptors)

This section includes the following:

- VSFB Scenario 2 ACAM Report
- VSFB Scenario 2 ACAM Detail Report

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

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

a. Action Location:
Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

c. Project Number/s (if applicable): Vandenberg Scenario 2 (Three Single-Launch Test Events per Year with Ground Delivery of the Missile Transport Vehicle and Interceptors)

d. Projected Action Start Date: 1 / 2024

e. Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

f. Point of Contact:

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

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

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.204	100	
NOx	1.345	100	
CO	1.420	250	
SOx	0.005	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
PM 10	0.849	250	
PM 2.5	0.047	250	
Pb	0.000	25	No
NH3	0.009	250	
CO2e	450.6		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.007	100	
NOx	0.004	100	
CO	0.043	250	
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	7.5		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.007	100	
NOx	0.004	100	
CO	0.043	250	
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	7.5		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.010	100	
NOx	0.035	100	
CO	0.052	250	
SOx	0.000	250	
PM 10	0.002	250	
PM 2.5	0.001	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	20.1		

2028 - (Steady State)

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

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
VOC	0.007	100	
NOx	0.004	100	
CO	0.043	250	
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	7.5		

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

Carolyn Hein, Contractor

. 11/3/2023 .
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

- Project Number/s (if applicable): Vandenberg Scenario 2 (Three Single-Launch Test Events per Year with Ground Delivery of the Missile Transport Vehicle and Interceptors)

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
The purpose of the Proposed Action is to develop a more innovative interceptor capable of providing increased protection for the United States (U.S.) from the emerging global threat of intercontinental ballistic missile attacks. The Ground-Based Midcourse Defense (GMD) system has become a capable and credible defense for today's threat, and the Proposed Action, as part of the GMD system, is needed to enable the U.S. to defend the homeland and defeat future threat advances into the 2030s and beyond.

- Action Description:
The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The

analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

- Point of Contact

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

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819
3.	Construction / Demolition	VSFB Site Preparations – Modifications for LF-23 and LF-24
4.	Construction / Demolition	VSFB Site Preparations – Modifications to Off-installation Warehouses
5.	Construction / Demolition	VSFB Testing – Delivery of Interceptors for Three Single Launch Test Events via Ground Transport
6.	Construction / Demolition	VSFB Testing – Delivery of Missile Transporter via Ground Transport
7.	Construction / Demolition	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819
8.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Ground Tests
9.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Flight Tests
10.	Personnel	VSFB Testing – Testing Personnel Requirements (2024)
11.	Personnel	VSFB Testing – Testing Personnel Requirements
12.	Construction / Demolition	VSFB Deployment and Operation – Delivery of Four Interceptors via Ground Transport
13.	Construction / Demolition	VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23,LF-24

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

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

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

- Activity Title: VSFB Site Preparations – Modify Existing Buildings 1555 and 1819

- Activity Description:

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It was assumed renovation of Buildings 1555 and 1819 would occur over a 3-month period from October 2024 through December 2024.

It was assumed 25 percent of the total square footage of the buildings (Building 1555 = 31,000 SF; Building 1819 = 60,250 SF; total = 91,250 SF) would be construction to equate the renovations (91,250 SF *0.25 = 22,812.5 SF).

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.077897
SO_x	0.001786
NO_x	0.553743
CO	0.532113
PM 10	0.025233

Pollutant	Total Emissions (TONs)
PM 2.5	0.019570
Pb	0.000000
NH_3	0.003560
CO_2e	177.7

2.1 Building Construction Phase

2.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

2.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 91250
Height of Building (ft): 60
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

2.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

2.1.4 Building Construction Phase Formula(s)

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Site Preparations – Modifications for LF-23 and LF-24

- Activity Description:
It was assumed modification of LF-23 and LF-24 would occur over a 3-month period from October 2024 through December 2024.

It was assumed the entire concrete launch pad area would be replaced and reinforced. Demolition of existing concrete would be required for each launch facility, at an estimated 22,250 SF for LF-23 and 40,250 SF for LF-24 (total = 62,500 SF). To equate the maximum potential for emissions, depth of demolition was assumed to be 60 feet. Demolition would begin in October 2024 and last approximately 1 month.

Construction for the reinforced concrete pads at LF-23 and LF-24 would occur on a total of 62,500 SF. Construction would begin in November 2024 and last approximately 2 months.

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.080159
SO_x	0.001834
NO_x	0.587026
CO	0.558440
PM 10	0.814625

Pollutant	Total Emissions (TONs)
PM 2.5	0.021015
Pb	0.000000
NH_3	0.003819
CO_2e	183.8

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

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3.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 62500
Height of Building to be demolished (ft): 60

- Default Settings Used: Yes

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- 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

3.1.3 Demolition Phase Emission Factor(s)

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

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

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3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards ($1\ yd^3 / 27\ ft^3$)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 11
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 2
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 62500
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

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- Vendor Trips Vehicle Mixture (%)

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

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0534	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

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

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

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

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- Activity Title: VSFB Site Preparations – Modifications to Off-installation Warehouses

- Activity Description:

It was assumed 25 percent of the total square footage of the buildings (5,000 SF each; 10,000 SF total) would be construction to equate the renovations (10,000 SF *0.25 = 2,500 SF). It was assumed renovation of the two off-installation warehouses (5,000 SF each; 10,000 SF total) would occur over a 3-month period from October 2024 through December 2024.

- Activity Start Date

Start Month: 10
Start Month: 2024

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.030078
SO_x	0.000641
NO_x	0.159204
CO	0.239155
PM 10	0.005664

Pollutant	Total Emissions (TONs)
PM 2.5	0.005334
Pb	0.000000
NH_3	0.000332
CO_2e	61.0

4.1 Building Construction Phase

4.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 10
Start Quarter: 1
Start Year: 2024

- Phase Duration

Number of Month: 3
Number of Days: 0

4.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 10000
Height of Building (ft): 25
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

4.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

4.1.4 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

5. Construction / Demolition

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Delivery of Interceptors for Three Single Launch Test Events via Ground Transport

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via ground transport (approximately 2,127 miles). Three roundtrips would be required for a total distance of 12,762 miles. The delivery vehicle will return to Courtland after all deliveries are complete. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002476
SO_x	0.000098
NO_x	0.028745
CO	0.007865
PM 10	0.001745

Pollutant	Total Emissions (TONs)
PM 2.5	0.000943
Pb	0.000000
NH_3	0.000464
CO_2e	10.7

5.1 Site Grading Phase

5.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

5.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

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- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 12762

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

5.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

5.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

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

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Delivery of Missile Transporter via Ground Transport

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to VSFB via ground transport (approximately 2,127 miles). Upon completion of testing, the missile transporter would return to Courtland, Alabama. Therefore, the total roundtrip distance was estimated to be 4,254 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date

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Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000825
SO_x	0.000033
NO_x	0.009582
CO	0.002622
PM 10	0.000582

Pollutant	Total Emissions (TONs)
PM 2.5	0.000314
Pb	0.000000
NH_3	0.000155
CO_2e	3.6

6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 4254

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

6.1.3 Site Grading Phase Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

6.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * 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

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819

- Activity Description:
The interceptors would be transferred from the VSFB airfield to Building 1555 or Building 1819 via the missile transporter for assembly, integration, and checkout. The average distance between the airfield and both buildings was used for the analysis (distance between the airfield and Building 1555 = 4.5 miles; distance between the airfield and Building 1819 = 6.5 miles; average distance = 5.5 miles). It was assumed 3 single-launch flight and 3 single-launch ground tests would occur annually and flight tests would use the same interceptors used for ground tests. Therefore, only 3 interceptors would be delivered from the airfield to Buildings 1555 and 1819 for a total roundtrip distance of 33 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000006
SO_x	0.000000
NO_x	0.000074
CO	0.000020
PM 10	0.000005

Pollutant	Total Emissions (TONs)
PM 2.5	0.000002
Pb	0.000000
NH_3	0.000001
CO_2e	0.0

7.1 Site Grading Phase

7.1.1 Site Grading Phase Timeline Assumptions

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- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

7.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 33

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

7.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

7.1.4 Site Grading Phase Formula(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

8. Construction / Demolition

8.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Ground Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). It was assumed 3 single-launch ground tests would occur annually. Therefore, a total of 3 interceptors would be delivered for a roundtrip distance of 69 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000013
SO_x	0.000001
NO_x	0.000155
CO	0.000043
PM 10	0.000009

Pollutant	Total Emissions (TONs)
PM 2.5	0.000005
Pb	0.000000
NH_3	0.000003
CO_2e	0.1

8.1 Site Grading Phase

8.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

8.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20

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

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 69

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

8.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

8.1.4 Site Grading Phase Formula(s)

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

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

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

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

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Flight Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7

miles; average distance = 11.5 miles). For 3 single-launch flight tests, a total of 3 interceptors would be delivered from the buildings for a total roundtrip distance of 69 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024; while flight testing would begin in 2026, and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000011
SO_x	0.000000
NO_x	0.000128
CO	0.000036
PM 10	0.000008

Pollutant	Total Emissions (TONs)
PM 2.5	0.000004
Pb	0.000000
NH_3	0.000003
CO_2e	0.1

9.1 Site Grading Phase

9.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

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

9.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 69

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

9.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

9.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

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

10. Personnel

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements (2024)

- Activity Description:
Approximately 20 personnel would be on site during preparation for the test launch, which would occur two weeks prior to a launch, and through the launch. For 3 annual test launches, it was conservatively assumed 20 additional personnel would be present for a total of 2 months annually. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 2
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005748
SO_x	0.000068
NO_x	0.002989

Pollutant	Total Emissions (TONs)
PM 2.5	0.000127
Pb	0.000000
NH_3	0.000510

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Pollutant	Total Emissions (TONs)
CO	0.036091
PM 10	0.000338

Pollutant	Total Emissions (TONs)
CO_2e	6.2

10.2 Personnel Assumptions

- Number of Personnel

Active Duty Personnel: 20
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: Yes

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

- Personnel Work Schedule

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

10.3 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

10.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

10.5 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

11. Personnel

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements

- Activity Description:
A maximum of 4 additional personnel would be at VSFB throughout the testing campaign, which was estimated to start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.006897
SO_x	0.000082
NO_x	0.003587
CO	0.043310
PM 10	0.000405

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.000153
Pb	0.000000
NH_3	0.000612
CO_2e	7.5

11.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 4
Civilian Personnel: 0

Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: Yes

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

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

11.3 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

11.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

11.5 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

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Deployment and Operation – Delivery of Four Interceptors via Ground Transport

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via ground transport (approximately 2127 miles). Four roundtrips would be required for a total distance of 17,016 miles. The delivery vehicle will return to Courtland after all deliveries are complete. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 4
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002758
SO_x	0.000113
NO_x	0.031611
CO	0.008892
PM 10	0.001989

Pollutant	Total Emissions (TONs)
PM 2.5	0.001088
Pb	0.000000
NH_3	0.000619
CO_2e	12.5

12.1 Site Grading Phase

12.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

12.1.2 Site Grading Phase Assumptions

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- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 17016

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

12.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

12.1.4 Site Grading Phase Formula(s)

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

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

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

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

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23, LF-24

- Activity Description:

The interceptors would be transferred from the VSFB airfield to the silos at LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). The missile transporter would return to the airfield after all deliveries are complete. For delivery of 4 interceptors, the total roundtrip distance was estimated to be 92 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000015
SO_x	0.000001
NO_x	0.000171
CO	0.000048
PM 10	0.000011

Pollutant	Total Emissions (TONs)
PM 2.5	0.000006
Pb	0.000000
NH_3	0.000003
CO_2e	0.1

13.1 Site Grading Phase

13.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

13.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 92

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- 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): 0

- Worker Trips Vehicle Mixture (%)

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

13.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

13.1.4 Site Grading Phase Formula(s)

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

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

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

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)

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

5.0 VSFB Scenario 3 (Three Dual-Launch Test Events per Year with Air Delivery of the Missile Transport Vehicle and Interceptors)

This section includes the following:

- VSFB Scenario 3 ACAM Report
- VSFB Scenario 3 ACAM Detail Report

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

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

a. Action Location:
Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

c. Project Number/s (if applicable): Vandenberg Scenario 3: (Three Dual-launch Test Events per Year with Air Delivery of the Missile Transport Vehicle and Interceptors)

d. Projected Action Start Date: 1 / 2024

e. Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

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

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

f. Point of Contact:

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

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

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.225	100	
NOx	18.951	100	
CO	1.673	250	
SOx	0.588	250	
PM 10	2.151	250	
PM 2.5	1.221	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
Pb	0.000	25	No
NH3	0.009	250	
CO2e	2201.2		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.027	100	
NOx	15.127	100	
CO	0.269	250	
SOx	0.501	250	
PM 10	1.119	250	
PM 2.5	1.007	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	1520.2		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.027	100	
NOx	15.128	100	
CO	0.269	250	
SOx	0.501	250	
PM 10	1.119	250	
PM 2.5	1.007	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	1520.3		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.041	100	
NOx	25.210	100	
CO	0.420	250	
SOx	0.834	250	
PM 10	1.865	250	
PM 2.5	1.678	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	2528.8		

2028 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.027	100	
NOx	15.127	100	
CO	0.269	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
SOx	0.501	250	
PM 10	1.119	250	
PM 2.5	1.007	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	1520.2		

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

Carolyn Hein, Contractor

. 11/3/2023 .
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

- Project Number/s (if applicable): Vandenberg Scenario 3: (Three Dual-launch Test Events per Year with Air Delivery of the Missile Transport Vehicle and Interceptors)

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:

The purpose of the Proposed Action is to develop a more innovative interceptor capable of providing increased protection for the United States (U.S.) from the emerging global threat of intercontinental ballistic missile attacks. The Ground-Based Midcourse Defense (GMD) system has become a capable and credible defense for today's threat, and the Proposed Action, as part of the GMD system, is needed to enable the U.S. to defend the homeland and defeat future threat advances into the 2030s and beyond.

- Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The

analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

- Point of Contact

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

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819
3.	Construction / Demolition	VSFB Site Preparations – Modifications for LF-23 and LF-24
4.	Construction / Demolition	VSFB Site Preparations – Modifications to Off-installation Warehouses
5.	Aircraft	VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via C-17 (LTO)
6.	Aircraft	VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via C-17 (intermediate)
7.	Aircraft	VSFB Testing – Delivery of Missile Transporter via C-17 (LTO)
8.	Aircraft	VSFB Testing – Delivery of Missile Transporter via C-17 (intermediate)
9.	Construction / Demolition	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819
10.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Ground Tests
11.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Flight Tests
12.	Personnel	VSFB Testing – Testing Personnel Requirements
13.	Personnel	VSFB Testing – Testing Personnel Requirements
14.	Aircraft	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (LTO)
15.	Aircraft	VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (intermediate)
16.	Construction / Demolition	VSFB Deployment and Operation – Interceptors from VSFB Airfield to Buildings 1555 and 1819
17.	Construction / Demolition	VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23,LF-24

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

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Activity Title: VSFB Site Preparations – Modify Existing Buildings 1555 and 1819

- Activity Description:
It was assumed renovation of Buildings 1555 and 1819 would occur over a 3-month period from October 2024 through December 2024.

It was assumed 25 percent of the total square footage of the buildings (Building 1555 = 31,000 SF; Building 1819 = 60,250 SF; total = 91,250 SF) would be construction to equate the renovations (91,250 SF *0.25 = 22,812.5 SF).

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.077897
SO_x	0.001786
NO_x	0.553743
CO	0.532113
PM 10	0.025233

Pollutant	Total Emissions (TONs)
PM 2.5	0.019570
Pb	0.000000
NH_3	0.003560
CO_2e	177.7

2.1 Building Construction Phase

2.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

2.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 91250
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

2.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

2.1.4 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

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Site Preparations – Modifications for LF-23 and LF-24

- Activity Description:
It was assumed modification of LF-23 and LF-24 would occur over a 3-month period from October 2024 through December 2024.

It was assumed the entire concrete launch pad area would be replaced and reinforced. Demolition of existing concrete would be required for each launch facility, at an estimated 22,250 SF for LF-23 and 40,250 SF for LF-24 (total = 62,500 SF). To equate the maximum potential for emissions, depth of demolition was assumed to be 60 feet. Demolition would begin in October 2024 and last approximately 1 month.

Construction for the reinforced concrete pads at LF-23 and LF-24 would occur on a total of 62,500 SF. Construction would begin in November 2024 and last approximately 2 months.

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.080159
SO_x	0.001834
NO_x	0.587026
CO	0.558440
PM 10	0.814625

Pollutant	Total Emissions (TONs)
PM 2.5	0.021015
Pb	0.000000
NH_3	0.003819
CO_2e	183.8

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

3.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 62500
Height of Building to be demolished (ft): 60

- Default Settings Used: Yes

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- 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

3.1.3 Demolition Phase Emission Factor(s)

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

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 11
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 2
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 62500
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0534	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

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

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Site Preparations – Modifications to Off-installation Warehouses

- Activity Description:
It was assumed 25 percent of the total square footage of the buildings (5,000 SF each; 10,000 SF total) would be construction to equate the renovations (10,000 SF *0.25 = 2,500 SF). It was assumed renovation of the two off-installation warehouses (5,000 SF each; 10,000 SF total) would occur over a 3-month period from October 2024 through December 2024.

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.030078
SO_x	0.000641
NO_x	0.159204
CO	0.239155
PM 10	0.005664

Pollutant	Total Emissions (TONs)
PM 2.5	0.005334
Pb	0.000000
NH_3	0.000332
CO_2e	61.0

4.1 Building Construction Phase

4.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

4.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 10000
Height of Building (ft): 25
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

4.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

4.1.4 Building Construction Phase Formula(s)

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- 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

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via C-17 (LTO)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 6 total flights annually for delivery of the interceptors for three dual-launch tests. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.002238
SO_x	0.012694
NO_x	0.207618
CO	0.079808
PM 10	0.065418

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.058758
Pb	0.000000
NH_3	0.000000
CO_2e	38.4

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

Pollutant	Emissions Per Year (TONs)
VOC	0.002238
SO_x	0.012694
NO_x	0.207618
CO	0.079808
PM 10	0.065418

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.058758
Pb	0.000000
NH_3	0.000000
CO_2e	38.4

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

5.2.2 Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 6
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 15.9
Approach [Approach] (mins): 5.1
Climb Out [Intermediate] (mins): 1.2
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + $AEM_{APPROACH}$ + $AEM_{CLIMBOUT}$ + $AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
AE_{TRIM} = $AEPS_{IDLE}$ + $AEPS_{APPROACH}$ + $AEPS_{INTERMEDIATE}$ + $AEPS_{MILITARY}$ + $AEPS_{AFTERBURN}$

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

5.4 Auxiliary Power Unit (APU)

5.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

5.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via C-17 (intermediate)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 6 total flights annually for delivery of the interceptors for three dual-launch tests. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.018235
SO_x	0.487781
NO_x	14.916079
CO	0.145879
PM 10	1.053061

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.948210
Pb	0.000000
NH_3	0.000000
CO_2e	1474.3

- Activity Emissions [Test Cell part]:

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_2e	0.0

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

6.2.2 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	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 6
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 0

Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	219
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0

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

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Missile Transporter via C-17 (LTO)

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct one flight for delivery of the missile transporter. Only one missile transporter would need to be delivered during the testing phase. For the air transport scenario, the missile transporter would not be delivered back to Courtland, Alabama. The missile transporter would remain at VSFB for the duration of the testing, and deployment and operation phases.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000373
SO_x	0.002116
NO_x	0.034603
CO	0.013301
PM 10	0.010903

Pollutant	Total Emissions (TONs)
PM 2.5	0.009793
Pb	0.000000
NH_3	0.000000
CO_2e	6.4

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

Pollutant	Total Emissions (TONs)
VOC	0.000373
SO_x	0.002116
NO_x	0.034603
CO	0.013301
PM 10	0.010903

Pollutant	Total Emissions (TONs)
PM 2.5	0.009793
Pb	0.000000
NH_3	0.000000
CO_2e	6.4

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

7.2.2 Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 15.9
Approach [Approach] (mins): 5.1
Climb Out [Intermediate] (mins): 1.2
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

7.4 Auxiliary Power Unit (APU)

7.4.1 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	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

7.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Delivery of Missile Transporter via C-17 (intermediate)

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct one flight for delivery of the missile transporter. Only one missile transporter would need to be delivered during the testing phase. For the air transport scenario, the missile transporter would not be delivered back to Courtland, Alabama. The missile transporter would remain at VSFB for the duration of the testing, and deployment and operation phases.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.003039
SO_x	0.081297
NO_x	2.486013
CO	0.024313
PM 10	0.175510

Pollutant	Total Emissions (TONs)
PM 2.5	0.158035
Pb	0.000000
NH_3	0.000000
CO_2e	245.7

- Activity Emissions [Test Cell part]:

Pollutant	Total Emissions (TONs)
VOC	0.000000
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

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_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	0
Climb Out [Intermediate] (mins):	219
Takeoff [Military] (mins):	0
Takeoff [After Burn] (mins):	0

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

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

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

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

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year

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

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

- Aircraft Emissions for Trim per Year

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

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

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819

- Activity Description:
The interceptors would be transferred from the VSFB airfield to Building 1555 or Building 1819 via the missile transporter for assembly, integration, and checkout. The average distance between the airfield and both buildings was used for the analysis (distance between the airfield and Building 1555 = 4.5 miles; distance between the airfield and Building 1819 = 6.5 miles; average distance = 5.5 miles). It was assumed 3 dual-launch flight and 3 dual-launch ground tests would occur annually and flight tests would use the same interceptors used for ground tests. Therefore, only 6 interceptors would be delivered from the airfield to Buildings 1555 and 1819 for a total roundtrip distance of 66 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000013
SO_x	0.000001
NO_x	0.000149
CO	0.000041
PM 10	0.000009

Pollutant	Total Emissions (TONs)
PM 2.5	0.000005
Pb	0.000000
NH_3	0.000002
CO_2e	0.1

9.1 Site Grading Phase

9.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

9.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 66

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

9.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

9.1.4 Site Grading Phase Formula(s)

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)

WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

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

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

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

- Activity Location
County: Santa Barbara

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Ground Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). It was assumed 3 dual-launch ground tests would occur annually. Therefore, a total of 6 interceptors would be delivered for a roundtrip distance of 138 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)
VOC	0.000027	PM 2.5	0.000010
SO_x	0.000001	Pb	0.000000
NO_x	0.000311	NH_3	0.000005
CO	0.000085	CO_2e	0.1
PM 10	0.000019		

10.1 Site Grading Phase

10.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

10.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 138

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

10.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

10.1.4 Site Grading Phase Formula(s)

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

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

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

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

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23, LF-24 for Flight Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). For 3 dual-launch flight tests, a total of 6 interceptors would be delivered from the buildings for a total roundtrip distance of 138 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024; while flight testing would begin in 2026, and continue indefinitely.

- Activity Start Date
Start Month: 1

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Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000022
SO_x	0.000001
NO_x	0.000256
CO	0.000072
PM 10	0.000016

Pollutant	Total Emissions (TONs)
PM 2.5	0.000009
Pb	0.000000
NH_3	0.000005
CO_2e	0.1

11.1 Site Grading Phase

11.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

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

11.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 138

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

11.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

11.1.4 Site Grading Phase Formula(s)

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

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

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

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

12. Personnel

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements

- Activity Description:
Approximately 20 personnel would be on site during preparation for the test launch, which would occur two weeks prior to a launch, and through the launch. For 3 annual test launches, it was conservatively assumed 20 additional personnel would be present for a total of 2 months annually. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 2
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005748
SO_x	0.000068
NO_x	0.002989
CO	0.036091
PM 10	0.000338

Pollutant	Total Emissions (TONs)
PM 2.5	0.000127
Pb	0.000000
NH_3	0.000510
CO_2e	6.2

12.2 Personnel Assumptions

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- Number of Personnel
Active Duty Personnel: 20
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: Yes

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

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

12.3 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

12.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

12.5 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

13. Personnel

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements

- Activity Description:
A maximum of 4 additional personnel would be at VSFB throughout the testing campaign, which was estimated to start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.006897
SO_x	0.000082
NO_x	0.003587
CO	0.043310
PM 10	0.000405

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.000153
Pb	0.000000
NH_3	0.000612
CO_2e	7.5

13.2 Personnel Assumptions

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

- Default Settings Used: Yes

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

- Personnel Work Schedule

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

13.3 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

13.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

13.5 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

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (LTO)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 4 total flights for delivery of the interceptors.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001492
SO_x	0.008463
NO_x	0.138412
CO	0.053206
PM 10	0.043612

Pollutant	Total Emissions (TONs)
PM 2.5	0.039172
Pb	0.000000
NH_3	0.000000
CO_2e	25.6

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

Pollutant	Total Emissions (TONs)
VOC	0.001492
SO_x	0.008463
NO_x	0.138412
CO	0.053206
PM 10	0.043612

Pollutant	Total Emissions (TONs)
PM 2.5	0.039172
Pb	0.000000
NH_3	0.000000
CO_2e	25.6

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

14.2.2 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	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 4
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 15.9
Approach [Approach] (mins): 5.1
Climb Out [Intermediate] (mins): 1.2
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

14.4 Auxiliary Power Unit (APU)

14.4.1 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	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

14.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Deployment and Operation – Delivery of Four Interceptors via C-17 (intermediate)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via a C-17 (approximately 1,887.2 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 3.65 hours (219 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 4 total flights for delivery of the interceptors.

- Activity Start Date
Start Month: 1
Start Year: 2027

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.012157
SO_x	0.325188
NO_x	9.944053
CO	0.097252
PM 10	0.702040

Pollutant	Total Emissions (TONs)
PM 2.5	0.632140
Pb	0.000000
NH_3	0.000000
CO_2e	982.9

- Activity Emissions [Test Cell part]:

Pollutant	Total Emissions (TONs)
VOC	0.000000
SO_x	0.000000
NO_x	0.000000
CO	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

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Pollutant	Total Emissions (TONs)
PM 10	0.000000

Pollutant	Total Emissions (TONs)

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

15.2.2 Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 4
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 219
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0

Military (mins): 0
AfterBurn (mins): 0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + $AEM_{APPROACH}$ + $AEM_{CLIMBOUT}$ + $AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
AE_{TRIM} = $AEPS_{IDLE}$ + $AEPS_{APPROACH}$ + $AEPS_{INTERMEDIATE}$ + $AEPS_{MILITARY}$ + $AEPS_{AFTERBURN}$

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

16. Construction / Demolition

16.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Activity Title: VSFB Deployment and Operation – Interceptors from VSFB Airfield to Buildings 1555 and 1819

- Activity Description:
The interceptors would be transferred from the VSFB airfield to Building 1555 or Building 1819 via the missile transporter for assembly, integration, and checkout. The average distance between the airfield and both buildings was used for the analysis (distance between the airfield and Building 1555 = 4.5 miles; distance between the airfield and Building 1819 = 6.5 miles; average distance = 5.5 miles). The missile transporter would return to the airfield after all deliveries are complete. For delivery of 4 interceptors, the total roundtrip distance was estimated to be 44 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000007
SO_x	0.000000
NO_x	0.000082
CO	0.000023
PM 10	0.000005

Pollutant	Total Emissions (TONs)
PM 2.5	0.000003
Pb	0.000000
NH_3	0.000002
CO_2e	0.0

16.1 Site Grading Phase

16.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

16.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 44

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

16.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

16.1.4 Site Grading Phase Formula(s)

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

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

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

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

17. Construction / Demolition

17.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23,LF-24

- Activity Description:
The interceptors would be transferred from the VSFB airfield to the silos at LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). The missile transporter would return to the missile assembly building after all deliveries are complete. For delivery of 4 interceptors, the total roundtrip distance was estimated to be 92 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date

Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000015
SO_x	0.000001
NO_x	0.000171
CO	0.000048
PM 10	0.000011

Pollutant	Total Emissions (TONs)
PM 2.5	0.000006
Pb	0.000000
NH_3	0.000003
CO_2e	0.1

17.1 Site Grading Phase

17.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

17.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 92

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

17.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

17.1.4 Site Grading Phase Formula(s)

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

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

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * 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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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

6.0 VSFB Scenario 4 (Three Dual-Launch Test Events per Year with Ground Delivery of the Missile Transport Vehicle and Interceptors)

This section includes the following:

- VSFB Scenario 4 ACAM Report
- VSFB Scenario 4 ACAM Detail Report

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

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

a. Action Location:
Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

c. Project Number/s (if applicable): Vandenberg Scenario 4: (Three Dual-launch test events per Year with Ground Delivery of the Missile Transport Vehicle and Interceptors)

d. Projected Action Start Date: 1 / 2024

e. Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

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

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

f. Point of Contact:

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

2. Air Impact Analysis:

Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.207	100	
NOx	1.374	100	
CO	1.428	250	
SOx	0.005	250	
PM 10	0.850	250	
PM 2.5	0.048	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
Pb	0.000	25	No
NH3	0.010	250	
CO2e	461.4		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.007	100	
NOx	0.004	100	
CO	0.043	250	
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	7.5		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.007	100	
NOx	0.004	100	
CO	0.043	250	
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	7.6		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.010	100	
NOx	0.035	100	
CO	0.052	250	
SOx	0.000	250	
PM 10	0.002	250	
PM 2.5	0.001	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	20.1		

2028 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.007	100	
NOx	0.004	100	
CO	0.043	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.001	250	
CO2e	7.5		

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

Carolyn Hein, Contractor

11/3/2023
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: VANDENBERG AFB
State: California
County(s): Santa Barbara
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

- Project Number/s (if applicable): Vandenberg Scenario 4: (Three Dual-launch test events per Year with Ground Delivery of the Missile Transport Vehicle and Interceptors)

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
The purpose of the Proposed Action is to develop a more innovative interceptor capable of providing increased protection for the United States (U.S.) from the emerging global threat of intercontinental ballistic missile attacks. The Ground-Based Midcourse Defense (GMD) system has become a capable and credible defense for today's threat, and the Proposed Action, as part of the GMD system, is needed to enable the U.S. to defend the homeland and defeat future threat advances into the 2030s and beyond.

- Action Description:
The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The

analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

- Point of Contact

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

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	VSFB Site Preparations – Modify Existing Buildings 1555 and 1819
3.	Construction / Demolition	VSFB Site Preparations – Modifications for LF-23 and LF-24
4.	Construction / Demolition	VSFB Site Preparations – Modifications to Off-installation Warehouses
5.	Construction / Demolition	VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via Ground Transport
6.	Construction / Demolition	VSFB Testing – Delivery of Missile Transporter via Ground Transport
7.	Construction / Demolition	VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819
8.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Ground Tests
9.	Construction / Demolition	VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Flight Tests
10.	Personnel	VSFB Testing – Testing Personnel Requirements (2024)
11.	Personnel	VSFB Testing – Testing Personnel Requirements
12.	Construction / Demolition	VSFB Deployment and Operation – Delivery of Four Interceptors via Ground Transport
13.	Construction / Demolition	VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23, LF-24

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

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

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

- Activity Title: VSFB Site Preparations – Modify Existing Buildings 1555 and 1819

- Activity Description:

It was assumed renovation of Buildings 1555 and 1819 would occur over a 3-month period from October 2024 through December 2024.

It was assumed 25 percent of the total square footage of the buildings (Building 1555 = 31,000 SF; Building 1819 = 60,250 SF; total = 91,250 SF) would be construction to equate the renovations (91,250 SF *0.25 = 22,812.5 SF).

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.077897
SO_x	0.001786
NO_x	0.553743
CO	0.532113
PM 10	0.025233

Pollutant	Total Emissions (TONs)
PM 2.5	0.019570
Pb	0.000000
NH_3	0.003560
CO_2e	177.7

2.1 Building Construction Phase

2.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

2.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 91250
Height of Building (ft): 60
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

2.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

2.1.4 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

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Site Preparations – Modifications for LF-23 and LF-24

- Activity Description:
It was assumed modification of LF-23 and LF-24 would occur over a 3-month period from October 2024 through December 2024.

It was assumed the entire concrete launch pad area would be replaced and reinforced. Demolition of existing concrete would be required for each launch facility, at an estimated 22,250 SF for LF-23 and 40,250 SF for LF-24 (total = 62,500 SF). To equate the maximum potential for emissions, depth of demolition was assumed to be 60 feet. Demolition would begin in October 2024 and last approximately 1 month.

Construction for the reinforced concrete pads at LF-23 and LF-24 would occur on a total of 62,500 SF. Construction would begin in November 2024 and last approximately 2 months.

- Activity Start Date
Start Month: 10
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.080159
SO_x	0.001834
NO_x	0.587026
CO	0.558440
PM 10	0.814625

Pollutant	Total Emissions (TONs)
PM 2.5	0.021015
Pb	0.000000
NH_3	0.003819
CO_2e	183.8

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2024

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

3.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 62500
Height of Building to be demolished (ft): 60

- Default Settings Used: Yes

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- 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

3.1.3 Demolition Phase Emission Factor(s)

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

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 11
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 2
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 62500
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0085	0.0001	0.0534	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

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

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: VSFB Site Preparations – Modifications to Off-installation Warehouses

- Activity Description:

It was assumed 25 percent of the total square footage of the buildings (5,000 SF each; 10,000 SF total) would be construction to equate the renovations (10,000 SF *0.25 = 2,500 SF). It was assumed renovation of the two off-installation warehouses (5,000 SF each; 10,000 SF total) would occur over a 3-month period from October 2024 through December 2024.

- Activity Start Date

Start Month: 10
Start Month: 2024

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.030078
SO_x	0.000641
NO_x	0.159204
CO	0.239155
PM 10	0.005664

Pollutant	Total Emissions (TONs)
PM 2.5	0.005334
Pb	0.000000
NH_3	0.000332
CO_2e	61.0

4.1 Building Construction Phase

4.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 10
Start Quarter: 1
Start Year: 2024

- Phase Duration

Number of Month: 3
Number of Days: 0

4.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 10000
Height of Building (ft): 25
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

4.1.3 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	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

4.1.4 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

5. Construction / Demolition

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Delivery of Interceptors for Three Dual-Launch Test Events via Ground Transport

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via ground transport (approximately 2,127 miles). Six roundtrips would be required for a total distance of 25,524 miles. The delivery vehicle will return to Courtland after all deliveries are complete. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.004953
SO_x	0.000197
NO_x	0.057490
CO	0.015730
PM 10	0.003489

Pollutant	Total Emissions (TONs)
PM 2.5	0.001885
Pb	0.000000
NH_3	0.000929
CO_2e	21.4

5.1 Site Grading Phase

5.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

5.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 25524

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

5.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

5.1.4 Site Grading Phase Formula(s)

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

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

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

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

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Delivery of Missile Transporter via Ground Transport

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to VSFB via ground transport (approximately 2,127 miles). Upon completion of testing, the missile transporter would return to Courtland, Alabama. Therefore, the total roundtrip distance was estimated to be 4,254 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date

Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000825
SO_x	0.000033
NO_x	0.009582
CO	0.002622
PM 10	0.000582

Pollutant	Total Emissions (TONs)
PM 2.5	0.000314
Pb	0.000000
NH_3	0.000155
CO_2e	3.6

6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 4254

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

6.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

6.1.4 Site Grading Phase Formula(s)

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

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

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * 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

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Transport of Interceptors from VSFB Airfield to Buildings 1555 and 1819

- Activity Description:
The interceptors would be transferred from the VSFB airfield to Building 1555 or Building 1819 via the missile transporter for assembly, integration, and checkout. The average distance between the airfield and both buildings was used for the analysis (distance between the airfield and Building 1555 = 4.5 miles; distance between the airfield and Building 1819 = 6.5 miles; average distance = 5.5 miles). It was assumed 3 dual-launch flight and 3 dual-launch ground tests would occur annually and flight tests would use the same interceptors used for ground tests. Therefore, only 6 interceptors would be delivered from the airfield to Buildings 1555 and 1819 for a total roundtrip distance of 66 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000013
SO_x	0.000001
NO_x	0.000149
CO	0.000041
PM 10	0.000009

Pollutant	Total Emissions (TONs)
PM 2.5	0.000005
Pb	0.000000
NH_3	0.000002
CO_2e	0.1

7.1 Site Grading Phase

7.1.1 Site Grading Phase Timeline Assumptions

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- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

7.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 66

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

7.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

7.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * 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

8. Construction / Demolition

8.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Ground Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). It was assumed 3 dual-launch ground tests would occur annually. Therefore, a total of 6 interceptors would be delivered for a roundtrip distance of 138 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000027
SO_x	0.000001
NO_x	0.000311
CO	0.000085
PM 10	0.000019

Pollutant	Total Emissions (TONs)
PM 2.5	0.000010
Pb	0.000000
NH_3	0.000005
CO_2e	0.1

8.1 Site Grading Phase

8.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

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

8.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 138

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

8.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

8.1.4 Site Grading Phase Formula(s)

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

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

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

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

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Testing – Interceptors from Buildings 1555, 1819 to the Silos at LF-23 and LF-24 for Flight Tests

- Activity Description:
The interceptors would be transferred from Building 1555 or Building 1819 to LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7 miles; average distance = 11.5 miles). For 3 dual-launch flight tests, a total of 6 interceptors would be delivered from the buildings for a total roundtrip distance of 138 miles. The site grading activity phase was used to

calculate emissions from transport of the interceptors. The testing campaign would start in 2024; while flight testing would begin in 2026, and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000022
SO_x	0.000001
NO_x	0.000256
CO	0.000072
PM 10	0.000016

Pollutant	Total Emissions (TONs)
PM 2.5	0.000009
Pb	0.000000
NH_3	0.000005
CO_2e	0.1

9.1 Site Grading Phase

9.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

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

9.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 138

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

9.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

9.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

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

10. Personnel

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements (2024)

- Activity Description:
Approximately 20 personnel would be on site during preparation for the test launch, which would occur two weeks prior to a launch, and through the launch. For 3 annual test launches, it was conservatively assumed 20 additional personnel would be present for a total of 2 months annually. The testing campaign would start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 2
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005748
SO_x	0.000068
NO_x	0.002989
CO	0.036091
PM 10	0.000338

Pollutant	Total Emissions (TONs)
PM 2.5	0.000127
Pb	0.000000
NH_3	0.000510
CO_2e	6.2

10.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 20
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: Yes

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

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

10.3 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

10.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

10.5 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

11. Personnel

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: VSFB Testing – Testing Personnel Requirements

- Activity Description:
A maximum of 4 additional personnel would be at VSFB throughout the testing campaign, which was estimated to start in 2024 and continue indefinitely.

- Activity Start Date
Start Month: 1
Start Year: 2024

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

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.006897
SO_x	0.000082
NO_x	0.003587
CO	0.043310
PM 10	0.000405

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.000153
Pb	0.000000
NH_3	0.000612
CO_2e	7.5

11.2 Personnel Assumptions

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

- Default Settings Used: Yes

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

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

11.3 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

11.4 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_2e
LDGV	000.164	000.003	000.093	001.268	000.017	000.006		000.025	00285.560
LDGT	000.217	000.004	000.177	001.754	000.018	000.007		000.027	00356.560
HDGV	000.273	000.005	000.286	002.004	000.029	000.010		000.052	00545.059
LDDV	000.026	000.002	000.237	000.323	000.031	000.020		000.008	00225.935
LDDT	000.017	000.003	000.082	000.161	000.025	000.013		000.009	00309.267
HDDV	000.176	000.007	002.043	000.559	000.124	000.067		000.033	00760.601
MC	005.697	000.002	000.762	018.634	000.019	000.008		000.053	00210.432

11.5 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

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Deployment and Operation – Delivery of Four Interceptors via Ground Transport

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to VSFB via ground transport (approximately 2127 miles). Four roundtrips would be required for a total distance of 17,016 miles. The delivery vehicle will return to Courtland after all deliveries are complete. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 4
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002758
SO_x	0.000113
NO_x	0.031611
CO	0.008892
PM 10	0.001989

Pollutant	Total Emissions (TONs)
PM 2.5	0.001088
Pb	0.000000
NH_3	0.000619
CO_2e	12.5

12.1 Site Grading Phase

12.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

12.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20

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

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 17016

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

12.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

12.1.4 Site Grading Phase Formula(s)

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

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

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * 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

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

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

- Activity Title: VSFB Deployment and Operation – Interceptors from Buildings 1555,1819 to the Silos at LF-23, LF-24

- Activity Description:
The interceptors would be transferred from the VSFB airfield to the silos at LF-23 or LF-24 via the missile transporter. The average distance between the both buildings and both launch facilities was used for the analysis (distance between Building 1555 and LF-23 = 16 miles; distance between Building 1555 and LF-24 = 16.1 miles; distance between Building 1819 and LF-23= 6.8 miles; distance between Building 1819 and LF-24= 7

miles; average distance = 11.5 miles). The missile transporter would return to the airfield after all deliveries are complete. For delivery of 4 interceptors, the total roundtrip distance was estimated to be 92 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000015
SO_x	0.000001
NO_x	0.000171
CO	0.000048
PM 10	0.000011

Pollutant	Total Emissions (TONs)
PM 2.5	0.000006
Pb	0.000000
NH_3	0.000003
CO_2e	0.1

13.1 Site Grading Phase

13.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

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

13.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 92

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

13.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.139	000.002	000.072	001.003	000.014	000.005		000.025	00241.071
LDGT	000.190	000.003	000.140	001.434	000.016	000.006		000.027	00314.132
HDGV	000.235	000.005	000.222	001.615	000.025	000.009		000.052	00465.357
LDDV	000.018	000.002	000.157	000.243	000.023	000.014		000.008	00183.680
LDDT	000.014	000.003	000.064	000.137	000.022	000.011		000.009	00278.098
HDDV	000.147	000.006	001.685	000.474	000.106	000.058		000.033	00666.113
MC	005.142	000.002	000.643	015.891	000.016	000.007		000.053	00177.342

13.1.4 Site Grading Phase Formula(s)

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

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

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

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

7.0 FGA Scenario 1 (Air Delivery of the Missile Transporter)

This section includes the following:

- FGA Scenario 1 ACAM Report
- FGA Scenario 2 ACAM Detail Report

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

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

a. Action Location:
Base: NO BASE
State: Alaska
County(s): Southeast Fairbanks
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

c. Project Number/s (if applicable): Fort Greely Scenario 1: Air Delivery of the Missile Transporter

d. Projected Action Start Date: 5 / 2026

e. Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

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

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

f. Point of Contact:

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

2. Air Impact Analysis:

Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.795	250	
NOx	4.404	250	
CO	6.124	250	
SOx	0.016	250	
PM 10	2.826	250	
PM 2.5	0.152	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
Pb	0.000	25	No
NH3	0.007	250	
CO2e	1652.9		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.467	250	
NOx	2.716	250	
CO	3.903	250	
SOx	0.009	250	
PM 10	1.103	250	
PM 2.5	0.085	250	
Pb	0.000	25	No
NH3	0.007	250	
CO2e	1050.5		

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.789	250	
NOx	2.720	250	
CO	3.908	250	
SOx	0.009	250	
PM 10	1.103	250	
PM 2.5	0.085	250	
Pb	0.000	25	No
NH3	0.007	250	
CO2e	1052.8		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.356	250	
NOx	274.245	250	Yes
CO	3.474	250	
SOx	9.028	250	
PM 10	19.877	250	
PM 2.5	17.897	250	
Pb	0.000	25	No
NH3	0.000	250	
CO2e	27288.6		

2030 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	250	
NOx	0.000	250	
CO	0.000	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.000	250	
CO2e	0.0		

The estimated annual net emissions associated with this action temporarily exceed the insignificance indicators. However, the steady state estimated annual net emissions are below the insignificance indicators showing no significant long-term impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

Carolyn Hein, Contractor

. 11/3/2023 .
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: NO BASE
State: Alaska
County(s): Southeast Fairbanks
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

- Project Number/s (if applicable): Fort Greely Scenario 1: Air Delivery of the Missile Transporter

- Projected Action Start Date: 5 / 2026

- Action Purpose and Need:

The purpose of the Proposed Action is to develop a more innovative interceptor capable of providing increased protection for the United States (U.S.) from the emerging global threat of intercontinental ballistic missile attacks. The Ground-Based Midcourse Defense (GMD) system has become a capable and credible defense for today's threat, and the Proposed Action, as part of the GMD system, is needed to enable the U.S. to defend the homeland and defeat future threat advances into the 2030s and beyond.

- Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

- Point of Contact

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

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	FGA Site Preparations – Modify 60 GBI Silos (2026)
3.	Construction / Demolition	FGA Site Preparations – Modify 60 GBI Silos (2027)
4.	Construction / Demolition	FGA Site Preparations – Modify 60 GBI Silos (2027)
5.	Construction / Demolition	FGA Site Preparations – Modifications for Building 663
6.	Construction / Demolition	FGA Site Preparations – Construct New Missile Assembly Building
7.	Construction / Demolition	FGA Site Preparations – Construct New Missile Assembly Building (2028 construction phase only)
8.	Construction / Demolition	FGA Site Preparations – Construct New KV Oxidizer Storage Facility
9.	Construction / Demolition	FGA Site Preparations – Construct New KV Oxidizer Storage Facility (2028 construction phase only)
10.	Construction / Demolition	FGA Site Preparations – Construct New KV Fuel Storage Facility
11.	Construction / Demolition	FGA Site Preparations – Construct New KV Fuel Storage Facility (2028 construction phase only)
12.	Construction / Demolition	FGA Site Preparations – Construct Two New Interceptor Storage Facilities
13.	Construction / Demolition	FGA Site Preparations – Construct Two Interceptor Storage Facilities (2028 construction phase only)
14.	Aircraft	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (LTO)
15.	Aircraft	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (intermediate)
16.	Aircraft	FGA Deployment and Operation – Delivery of Missile Transporter via C-17 (LTO)
17.	Aircraft	FGA Deployment and Operation – Delivery of Missile Transporter via C-17 (intermediate)
18.	Construction / Demolition	FGA Deployment and Operation – Interceptors from the FGA Airfield to the Missile Assembly Building
19.	Construction / Demolition	FGA Deployment and Operation – Interceptors from the Missile Assembly Building to the Silos

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

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Activity Title: FGA Site Preparations – Modify 60 GBI Silos (2026)

- Activity Description:

Pavement within the entire GMD silo fenced area (approximately 66.7 acres; 2,905,000 SF) would require replacement and reinforcement. It was assumed 20 GBI silos and surrounding pavement, or one third of the total number of silos and surrounding pavements would be modified each year during the site preparations period.

It was assumed approximately 22.23 acres (968,350 SF) would be replaced and reinforced. Demolition of existing concrete and pavements would total 968,350 SF. To equate the maximum potential for emissions, depth of demolition was assumed to be 5 feet. Demolition would begin in May 2026 and last approximately 3 months.

Construction for the reinforced concrete pads at each silo would occur on a total of 968,350 SF. Construction would begin in August 2026 and last approximately 3 months.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.237324
SO_x	0.004530
NO_x	1.558478
CO	1.804566
PM 10	1.066854

Pollutant	Total Emissions (TONs)
PM 2.5	0.049532
Pb	0.000000
NH_3	0.005017
CO_2e	559.8

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

2.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 968350
Height of Building to be demolished (ft): 5

- Default Settings Used: Yes

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	3	8
Rubber Tired Dozers Composite	2	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

2.1.3 Demolition Phase Emission Factor(s)

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

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
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

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

2.2 Building Construction Phase

2.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

- Phase Duration

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Number of Month: 3
Number of Days: 0

2.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 968350
Height of Building (ft): 5
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
Forklifts Composite	3	8
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	3	7
Welders Composite	1	8

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

2.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0533	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539

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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

2.2.4 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

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Modify 60 GBI Silos (2027)

- Activity Description:
Pavement within the entire GMD silo fenced area (approximately 66.7 acres; 2,905,000 SF) would require replacement and reinforcement. It was assumed 20 GBI silos and surrounding pavement, or one third of the total number of silos and surrounding pavements would be modified each year during the site preparations period.

It was assumed approximately 22.23 acres (968,350 SF) would be replaced and reinforced. Demolition of existing concrete and pavements would total 968,350 SF. To equate the maximum potential for emissions, depth of demolition was assumed to be 5 feet. Demolition would begin in May 2027 and last approximately 3 months.

Construction for the reinforced concrete pads at each silo would occur on a total of 968,350 SF. Construction would begin in August 2027 and last approximately 3 months.

- Activity Start Date
Start Month: 5
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.237324
SO_x	0.004530
NO_x	1.558478
CO	1.804566
PM 10	1.066854

Pollutant	Total Emissions (TONs)
PM 2.5	0.049532
Pb	0.000000
NH_3	0.005017
CO_2e	559.8

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

3.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 968350
Height of Building to be demolished (ft): 5

- 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	3	8
Rubber Tired Dozers Composite	2	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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

3.1.3 Demolition Phase Emission Factor(s)

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

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
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

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)

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

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2027

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

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 968350
Height of Building (ft): 5
Number of Units: N/A

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

- Construction Exhaust

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
Forklifts Composite	3	8
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	3	7
Welders Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

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

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0533	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

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

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Modify 60 GBI Silos (2027)

- Activity Description:
Pavement within the entire GMD silo fenced area (approximately 66.7 acres; 2,905,000 SF) would require replacement and reinforcement. It was assumed 20 GBI silos and surrounding pavement, or one third of the total number of silos and surrounding pavements would be modified each year during the site preparations period.

It was assumed approximately 22.23 acres (968,350 SF) would be replaced and reinforced. Demolition of existing concrete and pavements would total 968,350 SF. To equate the maximum potential for emissions, depth of demolition was assumed to be 5 feet. Demolition would begin in May 2028 and last approximately 3 months.

Construction for the reinforced concrete pads at each silo would occur on a total of 968,350 SF. Construction would begin in August 2028 and last approximately 3 months.

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.237324
SO_x	0.004530

Pollutant	Total Emissions (TONs)
PM 2.5	0.049532
Pb	0.000000

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Pollutant	Total Emissions (TONs)
NO_x	1.558478
CO	1.804566
PM 10	1.066854

Pollutant	Total Emissions (TONs)
NH_3	0.005017
CO_2e	559.8

4.1 Demolition Phase

4.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

4.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 968350
Height of Building to be demolished (ft): 5

- 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	3	8
Rubber Tired Dozers Composite	2	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

4.1.3 Demolition Phase Emission Factor(s)

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

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Rubber Tired Dozers Composite								

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	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

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

4.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

4.2 Building Construction Phase

4.2.1 Building Construction Phase Timeline Assumptions

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

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

4.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 968350
Height of Building (ft): 5
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
Forklifts Composite	3	8
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	3	7
Welders Composite	1	8

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

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	0	0	0	0	0	100.00	0

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

4.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0085	0.0001	0.0533	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

4.2.4 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

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

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Modifications for Building 663

- Activity Description:
It was assumed 25 percent of the total square footage of Building 663 (14,000 SF) would be construction to equate the renovations (14,000 SF *0.25 = 3,500 SF). It was assumed modification of Buildings 663 would occur over a 6-month period from May 2026 through October 2026.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.056898
SO_x	0.001191
NO_x	0.279319
CO	0.518535
PM 10	0.008819

Pollutant	Total Emissions (TONs)
PM 2.5	0.008806
Pb	0.000000
NH_3	0.000401
CO_2e	117.6

5.1 Building Construction Phase

5.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

5.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 3500
Height of Building (ft): 25

Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

5.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

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5.1.4 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

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New Missile Assembly Building

- Activity Description:
Construction of the new missile assembly building (18,750 SF) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

Site grading would occur on the footprint for the new building (18,750 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site (18,750 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the new missile assembly building would total approximately 18,750 SF. The height of the missile assembly building was assumed to be 60 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the building, totaling 18,750 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.402193
SO_x	0.003765
NO_x	0.966602
CO	1.499230
PM 10	1.152255

Pollutant	Total Emissions (TONs)
PM 2.5	0.033015
Pb	0.000000
NH_3	0.001354
CO_2e	384.9

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6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 18750
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

6.1.3 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

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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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

6.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * 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

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- 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

6.2 Trenching/Excavating Phase

6.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

6.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 18750
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

6.2.3 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_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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

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)
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

6.3 Building Construction Phase

6.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

6.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 18750
Height of Building (ft): 60
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

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_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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

6.3.4 Building Construction Phase Formula(s)

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- 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

6.4 Architectural Coatings Phase

6.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2028

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

6.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 18750
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

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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

6.4.4 Architectural Coatings Phase Formula(s)

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

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

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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

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New Missile Assembly Building (2028 construction phase only)

- Activity Description:
Construction of the new missile assembly building would total approximately 18,750 SF. The height of the missile assembly building was assumed to be 60 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.059277
SO_x	0.001264
NO_x	0.324999
CO	0.545987

Pollutant	Total Emissions (TONs)
PM 2.5	0.009483
Pb	0.000000
NH_3	0.000986
CO_2e	140.8

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Pollutant	Total Emissions (TONs)
PM 10	0.009569

Pollutant	Total Emissions (TONs)

7.1 Building Construction Phase

7.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

7.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 18750
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

7.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

7.1.4 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

8. Construction / Demolition

8.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New KV Oxidizer Storage Facility

- Activity Description:
Construction of the new KV oxidizer storage facility (1,000 SF) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

Site grading would occur on the footprint for the new facility (1,000 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site (1,000 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the new KV oxidizer storage facility would total approximately 1,000 SF. The height of the KV oxidizer storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the facility, totaling 1,000 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.193623
SO_x	0.003687
NO_x	0.918071
CO	1.467119
PM 10	0.091998

Pollutant	Total Emissions (TONs)
PM 2.5	0.032294
Pb	0.000000
NH_3	0.000716
CO_2e	360.1

8.1 Site Grading Phase

8.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

8.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1000
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

8.1.3 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

8.1.4 Site Grading Phase Formula(s)

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

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

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

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

8.2 Trenching/Excavating Phase

8.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

8.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

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Area of Site to be Trenched/Excavated (ft^2): 1000
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

8.2.3 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_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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

8.2.4 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)
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

8.3 Building Construction Phase

8.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

8.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 1000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

8.3.3 Building Construction Phase Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

8.3.4 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

8.4 Architectural Coatings Phase

8.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2028

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

8.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 1000
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

8.4.3 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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

8.4.4 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

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New KV Oxidizer Storage Facility (2028 construction phase only)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Description:

Construction of the new KV oxidizer storage facility would total approximately 1,000 SF. The height of the KV oxidizer storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date

Start Month: 5
Start Month: 2027

- Activity End Date

Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.056754
SO_x	0.001186
NO_x	0.276567
CO	0.516881
PM 10	0.008774

Pollutant	Total Emissions (TONs)
PM 2.5	0.008765
Pb	0.000000
NH_3	0.000365
CO_2e	116.2

9.1 Building Construction Phase

9.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

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

- Phase Duration

Number of Month: 6
Number of Days: 0

9.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 1000
Height of Building (ft): 25
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust (default)

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

- Vehicle Exhaust

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

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

- Vendor Trips Vehicle Mixture (%)

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

9.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

9.1.4 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

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Activity Title: FGA Site Preparations – Construct New KV Fuel Storage Facility

- Activity Description:
Construction of the new KV fuel storage facility (1,000 SF) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

Site grading would occur on the footprint for the new facility (1,000 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site (1,000 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the new KV fuel storage facility would total approximately 1,000 SF. The height of the KV fuel storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the facility, totaling 1,000 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.193623
SO_x	0.003687
NO_x	0.918071
CO	1.467119
PM 10	0.091998

Pollutant	Total Emissions (TONs)
PM 2.5	0.032294
Pb	0.000000
NH_3	0.000716
CO_2e	360.1

10.1 Site Grading Phase

10.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

10.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 1000
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

10.1.3 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.1.4 Site Grading Phase Formula(s)

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

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

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

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

10.2 Trenching/Excavating Phase

10.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

10.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 1000
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

10.2.3 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_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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.2.4 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)
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

10.3 Building Construction Phase

10.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

10.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 1000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

10.3.3 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_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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.3.4 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

10.4 Architectural Coatings Phase

10.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2028

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

10.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 1000
Number of Units: N/A

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

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

- Worker Trips Vehicle Mixture (%)

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

10.4.3 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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.4.4 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

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New KV Fuel Storage Facility (2028 construction phase only)

- Activity Description:
Construction of the new KV fuel storage facility would total approximately 1,000 SF. The height of the KV fuel storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.056754
SO_x	0.001186
NO_x	0.276567
CO	0.516881
PM 10	0.008774

Pollutant	Total Emissions (TONs)
PM 2.5	0.008765
Pb	0.000000
NH_3	0.000365
CO_2e	116.2

11.1 Building Construction Phase

11.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

11.1.2 Building Construction Phase Assumptions

- General Building Construction Information

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Building Category: Office or Industrial
Area of Building (ft^2): 1000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

11.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346

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	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

11.1.4 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

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct Two New Interceptor Storage Facilities

- Activity Description:
Construction of the new interceptor storage facilities (3,500 SF each; 7,000 SF total) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

Site grading would occur on the footprint for the new facilities (7,000 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site for both facilities (7,000 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the two new interceptor storage facilities would total approximately 7,000 SF. The height of the facilities was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the facilities, totaling 7,000 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.263351
SO_x	0.003691

Pollutant	Total Emissions (TONs)
PM 2.5	0.032331
Pb	0.000000

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Pollutant	Total Emissions (TONs)
NO_x	0.920534
CO	1.468599
PM 10	0.450165

Pollutant	Total Emissions (TONs)
NH_3	0.000748
CO_2e	361.3

12.1 Site Grading Phase

12.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

12.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 7000
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

12.1.3 Site Grading Phase Emission Factor(s)

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

Graders Composite

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	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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

12.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

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

12.2 Trenching/Excavating Phase

12.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

12.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 7000
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

12.2.3 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_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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

12.2.4 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)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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

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

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

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

12.3 Building Construction Phase

12.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

12.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Commercial or Retail

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Area of Building (ft^2): 7000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

12.3.3 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_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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

12.3.4 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

$VMT_{VE} = BA * BH * (0.32 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.32 / 1000): Conversion Factor ft^3 to trips (0.32 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

$VMT_{VT} = BA * BH * (0.05 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)

BH: Height of Building (ft)
(0.05 / 1000): Conversion Factor ft^3 to trips (0.05 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

12.4 Architectural Coatings Phase

12.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2028

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

12.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 7000
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

12.4.3 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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

12.4.4 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

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct Two Interceptor Storage Facilities (2028 construction phase only)

- Activity Description:
Construction of the two new interceptor storage facilities would total approximately 7,000 SF. The height of the facilities was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Pollutant	Total Emissions (TONs)
VOC	0.057098
SO_x	0.001197
NO_x	0.283172
CO	0.520850
PM 10	0.008882

Pollutant	Total Emissions (TONs)
PM 2.5	0.008863
Pb	0.000000
NH_3	0.000450
CO_2e	119.6

13.1 Building Construction Phase

13.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

13.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 7000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

13.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

13.1.4 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

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (LTO)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to FGA via a C-17 (approximately 3,390.04 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 6.56 hours (393 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 60 total flights for delivery of the interceptors.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.022379
SO_x	0.126938
NO_x	2.076180
CO	0.798083
PM 10	0.654175

Pollutant	Total Emissions (TONs)
PM 2.5	0.587580
Pb	0.000000
NH_3	0.000000
CO_2e	384.2

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

Pollutant	Total Emissions (TONs)
VOC	0.022379
SO_x	0.126938
NO_x	2.076180
CO	0.798083
PM 10	0.654175

Pollutant	Total Emissions (TONs)
PM 2.5	0.587580
Pb	0.000000
NH_3	0.000000
CO_2e	384.2

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

14.2.2 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	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations

Number of Aircraft:		1
Flight Operation Cycle Type:	LTO (Landing and Takeoff)	
Number of Annual Flight Operation Cycles for all Aircraft:		60
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	15.9
Approach [Approach] (mins):	5.1
Climb Out [Intermediate] (mins):	1.2
Takeoff [Military] (mins):	0.4
Takeoff [After Burn] (mins):	0

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

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

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

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

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year

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

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

14.4 Auxiliary Power Unit (APU)

14.4.1 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	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

14.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Activity Title: FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (intermediate)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to FGA via a C-17 (approximately 3,390.04 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 6.56 hours (393 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 60 total flights for delivery of the interceptors.

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.327228
SO_x	8.753336
NO_x	267.672111
CO	2.617820
PM 10	18.897389

Pollutant	Total Emissions (TONs)
PM 2.5	17.015831
Pb	0.000000
NH_3	0.000000
CO_2e	26456.3

- Activity Emissions [Test Cell part]:

Pollutant	Total Emissions (TONs)
VOC	0.000000
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

15.2.2 Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 60
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 393
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0

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

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

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

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

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{FOC}: Aircraft Emissions (TONs)

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: FGA Deployment and Operation – Delivery of Missile Transporter via C-17 (LTO)

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to FGA via a C-17 (approximately 3,390.04 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 6.56 hours (393 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct one flight for delivery of the missile transporter.

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Indefinite: No
End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)
VOC	0.000373	PM 2.5	0.009793
SO_x	0.002116	Pb	0.000000
NO_x	0.034603	NH_3	0.000000
CO	0.013301	CO_2e	6.4
PM 10	0.010903		

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

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)
VOC	0.000373	PM 2.5	0.009793
SO_x	0.002116	Pb	0.000000
NO_x	0.034603	NH_3	0.000000
CO	0.013301	CO_2e	6.4
PM 10	0.010903		

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

16.2.2 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	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	15.9
Approach [Approach] (mins):	5.1
Climb Out [Intermediate] (mins):	1.2
Takeoff [Military] (mins):	0.4
Takeoff [After Burn] (mins):	0

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

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

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

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

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year

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

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

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

16.4 Auxiliary Power Unit (APU)

16.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

16.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: FGA Deployment and Operation – Delivery of Missile Transporter via C-17 (intermediate)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Description:

The missile transporter would be delivered from Courtland, Alabama to FGA via a C-17 (approximately 3,390.04 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 6.56 hours (393 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct one flight for delivery of the missile transporter.

- Activity Start Date

Start Month: 1
Start Year: 2029

- Activity End Date

Indefinite: No
End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005454
SO_x	0.145889
NO_x	4.461202
CO	0.043630
PM 10	0.314956

Pollutant	Total Emissions (TONs)
PM 2.5	0.283597
Pb	0.000000
NH_3	0.000000
CO_2e	440.9

- Activity Emissions [Test Cell part]:

Pollutant	Total Emissions (TONs)
VOC	0.000000
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: C-17A
Engine Model: F117-PW-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:

17.2.2 Aircraft & Engines Emission Factor(s)

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

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 393
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0

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

- Trim Test
Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

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

- Aircraft Emissions for Flight Operation Cycles per Year
$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

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

- Aircraft Emissions for Trim per Year
AE_{TRIM} = $AEPS_{IDLE}$ + $AEPS_{APPROACH}$ + $AEPS_{INTERMEDIATE}$ + $AEPS_{MILITARY}$ + $AEPS_{AFTERBURN}$

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

18. Construction / Demolition

18.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Deployment and Operation – Interceptors from the FGA Airfield to the Missile Assembly Building

- Activity Description:
The interceptors would be transferred from the FGA airfield to the missile assembly building via the missile transporter. The distance between the airfield and the missile assembly building is approximately 3 miles. The missile transporter would return to the airfield after all deliveries are complete. For transport of 60 interceptors, the total roundtrip distance was estimated to be 360 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2029

- Activity Emissions:

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Pollutant	Total Emissions (TONs)
VOC	0.000052
SO_x	0.000002
NO_x	0.000991
CO	0.000595
PM 10	0.000016

Pollutant	Total Emissions (TONs)
PM 2.5	0.000015
Pb	0.000000
NH_3	0.000013
CO_2e	0.5

18.1 Site Grading Phase

18.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

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

18.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 360

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

18.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

18.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * 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

19. Construction / Demolition

19.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Deployment and Operation – Interceptors from the Missile Assembly Building to the Silos

- Activity Description:
The interceptors would be transferred from the missile assembly building to the silos via the missile transporter. The average distance between the missile assembly building and the silos was used for the analysis (average distance = approximately 1 mile). The missile transporter would return to the missile assembly building after all deliveries are complete. For transport of 60 interceptors, the total roundtrip distance was estimated to be 120 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000017
SO_x	0.000001
NO_x	0.000330
CO	0.000198
PM 10	0.000005

Pollutant	Total Emissions (TONs)
PM 2.5	0.000005
Pb	0.000000
NH_3	0.000004
CO_2e	0.2

19.1 Site Grading Phase

19.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 0

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Number of Days: 1

19.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 120

- 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): 0

- Worker Trips Vehicle Mixture (%)

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

19.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

19.1.4 Site Grading Phase Formula(s)

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

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

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- 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

8.0 FGA Scenario 2 (Ground Delivery of the Missile Transporter)

This section includes the following:

- FGA Scenario 2 ACAM Report
- FGA Scenario 2 ACAM Detail Report

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

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

a. Action Location:
Base: NO BASE
State: Alaska
County(s): Southeast Fairbanks
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

c. Project Number/s (if applicable): Fort Greely Scenario 2: Ground Delivery of the Missile Transporter

d. Projected Action Start Date: 5 / 2026

e. Action Description:

The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

f. Point of Contact:

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

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

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

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

Analysis Summary:

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.795	250	
NOx	4.404	250	
CO	6.124	250	
SOx	0.016	250	

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
PM 10	2.826	250	
PM 2.5	0.152	250	
Pb	0.000	25	No
NH3	0.007	250	
CO2e	1652.9		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.467	250	
NOx	2.716	250	
CO	3.903	250	
SOx	0.009	250	
PM 10	1.103	250	
PM 2.5	0.085	250	
Pb	0.000	25	No
NH3	0.007	250	
CO2e	1050.5		

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.789	250	
NOx	2.720	250	
CO	3.908	250	
SOx	0.009	250	
PM 10	1.103	250	
PM 2.5	0.085	250	
Pb	0.000	25	No
NH3	0.007	250	
CO2e	1052.8		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.350	250	
NOx	269.760	250	Yes
CO	3.423	250	
SOx	8.880	250	
PM 10	19.552	250	
PM 2.5	17.604	250	
Pb	0.000	25	No
NH3	0.000	250	
CO2e	26846.7		

2030 - (Steady State)

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

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

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
VOC	0.000	250	
NOx	0.000	250	
CO	0.000	250	
SOx	0.000	250	
PM 10	0.000	250	
PM 2.5	0.000	250	
Pb	0.000	25	No
NH3	0.000	250	
CO2e	0.0		

The estimated annual net emissions associated with this action temporarily exceed the insignificance indicators. However, the steady state estimated annual net emissions are below the insignificance indicators showing no significant long-term impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

Carolyn Hein, Contractor

. 11/3/2023 .
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: NO BASE
State: Alaska
County(s): Southeast Fairbanks
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Ground-Based Midcourse Defense Next Generation Interceptor Programmatic Environmental Assessment

- Project Number/s (if applicable): Fort Greely Scenario 2: Ground Delivery of the Missile Transporter

- Projected Action Start Date: 5 / 2026

- Action Purpose and Need:
The purpose of the Proposed Action is to develop a more innovative interceptor capable of providing increased protection for the United States (U.S.) from the emerging global threat of intercontinental ballistic missile attacks. The Ground-Based Midcourse Defense (GMD) system has become a capable and credible defense for today's threat, and the Proposed Action, as part of the GMD system, is needed to enable the U.S. to defend the homeland and defeat future threat advances into the 2030s and beyond.

- Action Description:
The Proposed Action is to test, deploy, and operate the Next Generation Interceptor (NGI) to update and enhance the current Ground-Based Interceptor (GBI) fleet. The proposed NGI would be tested at the current GBI test site at Vandenberg Space Force Base (VSFB) and deployed and operated at the current deployed GBI sites of VSFB and Fort Greely, Alaska (FGA).

Activities at VSFB would include modification of existing facilities and silos to accommodate the NGI; potential modifications to off-base storage warehouse(s); transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; ground testing and flight testing; and ultimately deployment and operation of the NGIs.

Flight tests would include engagement firings of NGIs against ground- and air-launched target missiles over the Pacific Ocean. Activities over and within the Broad Ocean Area would include NGI and target missile overflights, missile booster drops, missile intercepts, and intercept or flight termination debris falling into the ocean.

Following the test phase at VSFB, NGIs would also be deployed and operated at FGA. Activities at FGA would include modification of existing facilities and silos to accommodate the NGI; potential construction of new facilities; transportation and receipt of the NGI; assembly and integration of NGI components (if required); storage, final inspection, and checkout of the interceptors; and deployment and operation of the NGIs. No flight or ground testing would be conducted at FGA, and the interceptors would be fired from FGA only for active national defense.

Air quality modeling is organized by location and project phase. Site preparations, testing, and deployment and operation would occur at VSFB. Site preparations, and deployment and operation would occur at FGA. The analysis for VSFB considers two scenarios that account for either air or ground delivery of the missile transport vehicle and interceptors to VSFB. The analysis for VSFB considers two additional scenarios that account for three single-launch flight test events and three dual-launch flight test events (i.e., six total annual launches) during the testing phase. For each flight test scenario, it was assumed ground testing would occur at the same rate (i.e., three single-launch flight tests and three single-launch ground tests, or three dual-launch flight tests and three dual-launch ground tests). Ground testing would consist of assembly at the missile assembly building, transport to the launch facility, emplacement of the interceptors in the silo(s), and transport back to the missile assembly building once the ground test is complete. Ground testing at VSFB would not include a launch. The

analysis for FGA considers two scenarios that account for either air or ground delivery of the missile transport vehicle. In both scenarios for FGA the interceptors would be delivered via air transport.

For the purposes of the analysis, the following timeline assumptions and surrogate years were used: 1) site preparations at VSFB would occur over a 3-month period from October 2024 through December 2024; 2) due to seasonal restrictions, site preparations at FGA would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028); 3) testing at VSFB would begin as early as 2024 for ground testing and as early as 2026 for flight testing, and would continue indefinitely; 4) deployment and operation at VSFB would occur as early as 2027; and 5) deployment and operation at FGA would occur following the construction period, or as early as 2029.

- Point of Contact

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

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	FGA Site Preparations – Modify 60 GBI Silos (2026)
3.	Construction / Demolition	FGA Site Preparations – Modify 60 GBI Silos (2027)
4.	Construction / Demolition	FGA Site Preparations – Modify 60 GBI Silos (2027)
5.	Construction / Demolition	FGA Site Preparations – Modifications for Building 663
6.	Construction / Demolition	FGA Site Preparations – Construct New Missile Assembly Building
7.	Construction / Demolition	FGA Site Preparations – Construct New Missile Assembly Building (2028 construction phase only)
8.	Construction / Demolition	FGA Site Preparations – Construct New KV Oxidizer Storage Facility
9.	Construction / Demolition	FGA Site Preparations – Construct New KV Oxidizer Storage Facility (2028 construction phase only)
10.	Construction / Demolition	FGA Site Preparations – Construct New KV Fuel Storage Facility
11.	Construction / Demolition	FGA Site Preparations – Construct New KV Fuel Storage Facility (2028 construction phase only)
12.	Construction / Demolition	FGA Site Preparations – Construct Two New Interceptor Storage Facilities
13.	Construction / Demolition	FGA Site Preparations – Construct Two Interceptor Storage Facilities (2028 construction phase only)
14.	Aircraft	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (LTO)
15.	Aircraft	FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (intermediate)
16.	Construction / Demolition	FGA Deployment and Operation – Delivery of Missile Transporter via Ground Transport
17.	Construction / Demolition	FGA Deployment and Operation – Interceptors from the FGA Airfield to the Missile Assembly Building
18.	Construction / Demolition	FGA Deployment and Operation – Interceptors from the Missile Assembly Building to the Silos

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

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Activity Title: FGA Site Preparations – Modify 60 GBI Silos (2026)

- Activity Description:

Pavement within the entire GMD silo fenced area (approximately 66.7 acres; 2,905,000 SF) would require replacement and reinforcement. It was assumed 20 GBI silos and surrounding pavement, or one third of the total number of silos and surrounding pavements would be modified each year during the site preparations period.

It was assumed approximately 22.23 acres (968,350 SF) would be replaced and reinforced. Demolition of existing concrete and pavements would total 968,350 SF. To equate the maximum potential for emissions, depth of demolition was assumed to be 5 feet. Demolition would begin in May 2026 and last approximately 3 months.

Construction for the reinforced concrete pads at each silo would occur on a total of 968,350 SF. Construction would begin in August 2026 and last approximately 3 months.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.237324
SO_x	0.004530
NO_x	1.558478
CO	1.804566
PM 10	1.066854

Pollutant	Total Emissions (TONs)
PM 2.5	0.049532
Pb	0.000000
NH_3	0.005017
CO_2e	559.8

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

2.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 968350
Height of Building to be demolished (ft): 5

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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	3	8
Rubber Tired Dozers Composite	2	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

2.1.3 Demolition Phase Emission Factor(s)

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

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
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

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)

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

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

2.2 Building Construction Phase

2.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Start Month: 8
Start Quarter: 1
Start Year: 2026

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

2.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 968350
Height of Building (ft): 5
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
Forklifts Composite	3	8
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	3	7
Welders Composite	1	8

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

2.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Cement and Mortar Mixers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0533	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

2.2.4 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

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Modify 60 GBI Silos (2027)

- Activity Description:

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Pavement within the entire GMD silo fenced area (approximately 66.7 acres; 2,905,000 SF) would require replacement and reinforcement. It was assumed 20 GBI silos and surrounding pavement, or one third of the total number of silos and surrounding pavements would be modified each year during the site preparations period.

It was assumed approximately 22.23 acres (968,350 SF) would be replaced and reinforced. Demolition of existing concrete and pavements would total 968,350 SF. To equate the maximum potential for emissions, depth of demolition was assumed to be 5 feet. Demolition would begin in May 2027 and last approximately 3 months.

Construction for the reinforced concrete pads at each silo would occur on a total of 968,350 SF. Construction would begin in August 2027 and last approximately 3 months.

- Activity Start Date
Start Month: 5
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.237324
SO_x	0.004530
NO_x	1.558478
CO	1.804566
PM 10	1.066854

Pollutant	Total Emissions (TONs)
PM 2.5	0.049532
Pb	0.000000
NH_3	0.005017
CO_2e	559.8

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

3.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 968350
Height of Building to be demolished (ft): 5

- Default Settings Used: Yes

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

- Construction Exhaust (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	3	8
Rubber Tired Dozers Composite	2	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

3.1.3 Demolition Phase Emission Factor(s)

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

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
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

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 3

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 968350
Height of Building (ft): 5
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
Forklifts Composite	3	8
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	3	7
Welders Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

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

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0533	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

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

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- 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

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Modify 60 GBI Silos (2027)

- Activity Description:
Pavement within the entire GMD silo fenced area (approximately 66.7 acres; 2,905,000 SF) would require replacement and reinforcement. It was assumed 20 GBI silos and surrounding pavement, or one third of the total number of silos and surrounding pavements would be modified each year during the site preparations period.

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It was assumed approximately 22.23 acres (968,350 SF) would be replaced and reinforced. Demolition of existing concrete and pavements would total 968,350 SF. To equate the maximum potential for emissions, depth of demolition was assumed to be 5 feet. Demolition would begin in May 2028 and last approximately 3 months.

Construction for the reinforced concrete pads at each silo would occur on a total of 968,350 SF. Construction would begin in August 2028 and last approximately 3 months.

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.237324
SO_x	0.004530
NO_x	1.558478
CO	1.804566
PM 10	1.066854

Pollutant	Total Emissions (TONs)
PM 2.5	0.049532
Pb	0.000000
NH_3	0.005017
CO_2e	559.8

4.1 Demolition Phase

4.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

4.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 968350
Height of Building to be demolished (ft): 5

- 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	3	8
Rubber Tired Dozers Composite	2	8

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

4.1.3 Demolition Phase Emission Factor(s)

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

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
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

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

4.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
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} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
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

4.2 Building Construction Phase

4.2.1 Building Construction Phase Timeline Assumptions

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

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

4.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 968350

Height of Building (ft): 5
Number of Units: N/A

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

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	8
Concrete/Industrial Saws Composite	1	8
Cranes Composite	1	8
Forklifts Composite	3	8
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	3	7
Welders Composite	1	8

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

4.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0533	0.0413	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
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								

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	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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

4.2.4 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

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Modifications for Building 663

- Activity Description:
It was assumed 25 percent of the total square footage of Building 663 (14,000 SF) would be construction to equate the renovations (14,000 SF *0.25 = 3,500 SF). It was assumed modification of Buildings 663 would occur over a 6-month period from May 2026 through October 2026.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2026

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- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.056898
SO_x	0.001191
NO_x	0.279319
CO	0.518535
PM 10	0.008819

Pollutant	Total Emissions (TONs)
PM 2.5	0.008806
Pb	0.000000
NH_3	0.000401
CO_2e	117.6

5.1 Building Construction Phase

5.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
Start Quarter: 1
Start Year: 2026

- Phase Duration

Number of Month: 6
Number of Days: 0

5.1.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 3500
Height of Building (ft): 25
Number of Units: N/A

- Building Construction Default Settings

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

- Construction Exhaust (default)

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

- Vehicle Exhaust

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

5.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

5.1.4 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

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New Missile Assembly Building

- Activity Description:
Construction of the new missile assembly building (18,750 SF) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

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Site grading would occur on the footprint for the new building (18,750 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site (18,750 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the new missile assembly building would total approximately 18,750 SF. The height of the missile assembly building was assumed to be 60 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the building, totaling 18,750 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.402193
SO_x	0.003765
NO_x	0.966602
CO	1.499230
PM 10	1.152255

Pollutant	Total Emissions (TONs)
PM 2.5	0.033015
Pb	0.000000
NH_3	0.001354
CO_2e	384.9

6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 18750
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)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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

6.1.3 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

6.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

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

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

6.2 Trenching/Excavating Phase

6.2.1 Trenching / Excavating Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

6.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 18750
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

6.2.3 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_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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

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

- Worker Trips Emissions per Phase

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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

6.3 Building Construction Phase

6.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

6.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 18750
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

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_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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

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)
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

6.4 Architectural Coatings Phase

6.4.1 Architectural Coatings Phase Timeline Assumptions

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

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Start Year: 2028

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

6.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 18750
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

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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

6.4.4 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

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New Missile Assembly Building (2028 construction phase only)

- Activity Description:
Construction of the new missile assembly building would total approximately 18,750 SF. The height of the missile assembly building was assumed to be 60 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.059277
SO_x	0.001264
NO_x	0.324999
CO	0.545987
PM 10	0.009569

Pollutant	Total Emissions (TONs)
PM 2.5	0.009483
Pb	0.000000
NH_3	0.000986
CO_2e	140.8

7.1 Building Construction Phase

7.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

- Phase Duration

Number of Month: 6
Number of Days: 0

7.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 18750
Height of Building (ft): 60
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

7.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

7.1.4 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

8. Construction / Demolition

8.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New KV Oxidizer Storage Facility

- Activity Description:
Construction of the new KV oxidizer storage facility (1,000 SF) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

Site grading would occur on the footprint for the new facility (1,000 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site (1,000 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the new KV oxidizer storage facility would total approximately 1,000 SF. The height of the KV oxidizer storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the facility, totaling 1,000 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.193623
SO_x	0.003687
NO_x	0.918071
CO	1.467119
PM 10	0.091998

Pollutant	Total Emissions (TONs)
PM 2.5	0.032294
Pb	0.000000
NH_3	0.000716
CO_2e	360.1

8.1 Site Grading Phase

8.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

8.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1000
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)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips Vehicle Mixture (%)

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

8.1.3 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

8.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

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)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

8.2 Trenching/Excavating Phase

8.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

8.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 1000
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)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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

8.2.3 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_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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

8.2.4 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)
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

8.3 Building Construction Phase

8.3.1 Building Construction Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

8.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 1000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

8.3.3 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_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

8.3.4 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

8.4 Architectural Coatings Phase

8.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2028

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

8.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 1000
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

8.4.3 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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

8.4.4 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

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

- Activity Location

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: FGA Site Preparations – Construct New KV Oxidizer Storage Facility (2028 construction phase only)

- Activity Description:
Construction of the new KV oxidizer storage facility would total approximately 1,000 SF. The height of the KV oxidizer storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date
Start Month: 5
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.056754
SO_x	0.001186
NO_x	0.276567
CO	0.516881
PM 10	0.008774

Pollutant	Total Emissions (TONs)
PM 2.5	0.008765
Pb	0.000000
NH_3	0.000365
CO_2e	116.2

9.1 Building Construction Phase

9.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

9.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 1000
Height of Building (ft): 25
Number of Units: N/A

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust (default)

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

- Vehicle Exhaust

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

- Vehicle Exhaust Vehicle Mixture (%)

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

- Worker Trips

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

- Worker Trips Vehicle Mixture (%)

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

- Vendor Trips

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

- Vendor Trips Vehicle Mixture (%)

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

9.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

9.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

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

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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

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New KV Fuel Storage Facility

- Activity Description:
Construction of the new KV fuel storage facility (1,000 SF) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

Site grading would occur on the footprint for the new facility (1,000 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site (1,000 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the new KV fuel storage facility would total approximately 1,000 SF. The height of the KV fuel storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the facility, totaling 1,000 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.193623
SO_x	0.003687
NO_x	0.918071
CO	1.467119
PM 10	0.091998

Pollutant	Total Emissions (TONs)
PM 2.5	0.032294
Pb	0.000000
NH_3	0.000716
CO_2e	360.1

10.1 Site Grading Phase

10.1.1 Site Grading Phase Timeline Assumptions

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- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

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

10.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1000
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

10.1.3 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

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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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * 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

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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

10.2 Trenching/Excavating Phase

10.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

10.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 1000
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

10.2.3 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_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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.2.4 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

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- 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

10.3 Building Construction Phase

10.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

10.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 1000

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Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

10.3.3 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_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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778

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	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.3.4 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

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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

10.4 Architectural Coatings Phase

10.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2028

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

10.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 1000
Number of Units: N/A

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

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

- Worker Trips Vehicle Mixture (%)

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

10.4.3 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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

10.4.4 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

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct New KV Fuel Storage Facility (2028 construction phase only)

- Activity Description:
Construction of the new KV fuel storage facility would total approximately 1,000 SF. The height of the KV fuel storage facility was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date

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Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.056754
SO_x	0.001186
NO_x	0.276567
CO	0.516881
PM 10	0.008774

Pollutant	Total Emissions (TONs)
PM 2.5	0.008765
Pb	0.000000
NH_3	0.000365
CO_2e	116.2

11.1 Building Construction Phase

11.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

11.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 1000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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	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

11.1.3 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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

11.1.4 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

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct Two New Interceptor Storage Facilities

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- Activity Description:

Construction of the new interceptor storage facilities (3,500 SF each; 7,000 SF total) would occur for 18 months over a 3-year period (May through October for 2026, 2027, and 2028).

Site grading would occur on the footprint for the new facilities (7,000 SF). Site grading would begin in May 2026 and last approximately 3 months.

It was assumed trenching for site utilities would occur on the entire site for both facilities (7,000 SF). Trenching would begin in August 2026 and last approximately 3 months. It was assumed all excavated material would be reused on site.

Construction of the two new interceptor storage facilities would total approximately 7,000 SF. The height of the facilities was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

Architectural coatings would be applied to the facilities, totaling 7,000 SF. Architectural coating application would begin in October 2028 and last approximately 1 month.

- Activity Start Date

Start Month: 5
Start Month: 2026

- Activity End Date

Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.263351
SO_x	0.003691
NO_x	0.920534
CO	1.468599
PM 10	0.450165

Pollutant	Total Emissions (TONs)
PM 2.5	0.032331
Pb	0.000000
NH_3	0.000748
CO_2e	361.3

12.1 Site Grading Phase

12.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 5
Start Quarter: 1
Start Year: 2026

- Phase Duration

Number of Month: 3
Number of Days: 0

12.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 7000
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

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- 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

12.1.3 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

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12.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

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

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

- Construction Exhaust Emissions per Phase

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

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 (%)

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2000: Conversion Factor pounds to tons

12.2 Trenching/Excavating Phase

12.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2026

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

12.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 7000
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

12.2.3 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_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								

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	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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

12.2.4 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)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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

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

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

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

12.3 Building Construction Phase

12.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2027

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

12.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Commercial or Retail
Area of Building (ft^2): 7000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

- Vehicle Exhaust

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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

12.3.3 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_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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

12.3.4 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

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- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.32 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.32 / 1000): Conversion Factor ft^3 to trips (0.32 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

$VMT_{VT} = BA * BH * (0.05 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.05 / 1000): Conversion Factor ft^3 to trips (0.05 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

12.4 Architectural Coatings Phase

12.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2028

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

12.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 7000
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

12.4.3 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_2e
LDGV	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

12.4.4 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

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

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

- Activity Title: FGA Site Preparations – Construct Two Interceptor Storage Facilities (2028 construction phase only)

- Activity Description:
Construction of the two new interceptor storage facilities would total approximately 7,000 SF. The height of the facilities was assumed to be 25 feet. Construction would begin in May 2027 and last approximately 6 months. Construction would begin again in May 2028 and last another 6 months (separate activity).

- Activity Start Date
Start Month: 5
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.057098
SO_x	0.001197
NO_x	0.283172
CO	0.520850
PM 10	0.008882

Pollutant	Total Emissions (TONs)
PM 2.5	0.008863
Pb	0.000000
NH_3	0.000450
CO_2e	119.6

13.1 Building Construction Phase

13.1.1 Building Construction Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2028

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

13.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 7000
Height of Building (ft): 25
Number of Units: N/A

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

- Construction Exhaust (default)

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

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

- Vehicle Exhaust Vehicle Mixture (%)

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

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

- Worker Trips Vehicle Mixture (%)

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

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

- Vendor Trips Vehicle Mixture (%)

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

13.1.3 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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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
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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

13.1.4 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

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

- Activity Title: FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (LTO)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to FGA via a C-17 (approximately 3,390.04 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 6.56 hours (393 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 60 total flights for delivery of the interceptors.

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No

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End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.022379
SO_x	0.126938
NO_x	2.076180
CO	0.798083
PM 10	0.654175

Pollutant	Total Emissions (TONs)
PM 2.5	0.587580
Pb	0.000000
NH_3	0.000000
CO_2e	384.2

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

Pollutant	Total Emissions (TONs)
VOC	0.022379
SO_x	0.126938
NO_x	2.076180
CO	0.798083
PM 10	0.654175

Pollutant	Total Emissions (TONs)
PM 2.5	0.587580
Pb	0.000000
NH_3	0.000000
CO_2e	384.2

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

14.2.2 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	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Flight Operation Cycle Type: LTO (Landing and Takeoff)
Number of Annual Flight Operation Cycles for all Aircraft: 60
Number of Annual Trim Test(s) per Aircraft: 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	15.9
Approach [Approach] (mins):	5.1
Climb Out [Intermediate] (mins):	1.2
Takeoff [Military] (mins):	0.4
Takeoff [After Burn] (mins):	0

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

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

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

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

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

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

- Aircraft Emissions per Mode for Trim per Year

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

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

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

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

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

14.4 Auxiliary Power Unit (APU)

14.4.1 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	0.5	No	331 250G	

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

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

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
331 250G	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

14.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: FGA Deployment and Operation – Delivery of 60 Interceptors via C-17 (intermediate)

- Activity Description:
The interceptors would be delivered from Courtland, Alabama to FGA via a C-17 (approximately 3,390.04 miles). The default time in modes were used to calculate emissions from takeoff and landing operations. It was assumed the C-17 would travel at a constant speed of 517 miles per hour (450 knots), which was used to estimate flying hours. Total flying hours was estimated at 6.56 hours (393 minutes). For the purposes of the analysis, default TIMs were used for LTO cycles and an intermediate power setting was used to estimate emissions during flight. It was assumed one C-17 would conduct 60 total flights for delivery of the interceptors.

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.327228
SO_x	8.753336
NO_x	267.672111
CO	2.617820
PM 10	18.897389

Pollutant	Total Emissions (TONs)
PM 2.5	17.015831
Pb	0.000000
NH_3	0.000000
CO_2e	26456.3

- Activity Emissions [Test Cell part]:

Pollutant	Total Emissions (TONs)
VOC	0.000000
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: F117-PW-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:

15.2.2 Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	978.00	0.37	1.07	3.76	22.70	10.67	9.60	3234
Approach	4645.00	0.05	1.07	15.49	0.51	5.53	4.98	3234
Intermediate	10408.00	0.04	1.07	32.72	0.32	2.31	2.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 60
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins): 0
Approach [Approach] (mins): 0
Climb Out [Intermediate] (mins): 393
Takeoff [Military] (mins): 0
Takeoff [After Burn] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 0
Approach (mins): 0
Intermediate (mins): 0
Military (mins): 0
AfterBurn (mins): 0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
FOC: Number of Flight Operation Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$AE_{FOC} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{FOC}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

16. Construction / Demolition

16.1 General Information & Timeline Assumptions

- Activity Location
County: Southeast Fairbanks
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FGA Deployment and Operation – Delivery of Missile Transporter via Ground Transport

- Activity Description:
The missile transporter would be delivered from Courtland, Alabama to FGA via ground transport (approximately 3,900 miles). The missile transporter would remain at FGA. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 1

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End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000559
SO_x	0.000017
NO_x	0.010732
CO	0.006450
PM 10	0.000176

Pollutant	Total Emissions (TONs)
PM 2.5	0.000159
Pb	0.000000
NH_3	0.000138
CO_2e	5.4

16.1 Site Grading Phase

16.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 1
Number of Days: 0

16.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 3900

- 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): 0

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

16.1.3 Site Grading Phase Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

16.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * 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

17. Construction / Demolition

17.1 General Information & Timeline Assumptions

- Activity Location
County: Southeast Fairbanks
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FGA Deployment and Operation – Interceptors from the FGA Airfield to the Missile Assembly Building

- Activity Description:
The interceptors would be transferred from the FGA airfield to the missile assembly building via the missile transporter. The distance between the airfield and the missile assembly building is approximately 3 miles. The missile transporter would return to the airfield after all deliveries are complete. For transport of 60 interceptors, the total roundtrip distance was estimated to be 360 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000052
SO_x	0.000002
NO_x	0.000991
CO	0.000595
PM 10	0.000016

Pollutant	Total Emissions (TONs)
PM 2.5	0.000015
Pb	0.000000
NH_3	0.000013
CO_2e	0.5

17.1 Site Grading Phase

17.1.1 Site Grading Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 0
Number of Days: 1

17.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 360

- 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): 0

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

17.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
HDGV	000.737	000.003	000.743	016.517	000.024	000.021		000.051	00903.074
LDDV	000.105	000.001	000.080	002.791	000.003	000.002		000.008	00299.346
LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

17.1.4 Site Grading Phase Formula(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- 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

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

18. Construction / Demolition

18.1 General Information & Timeline Assumptions

- Activity Location
County: Southeast Fairbanks
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: FGA Deployment and Operation – Interceptors from the Missile Assembly Building to the Silos

- Activity Description:
The interceptors would be transferred from the missile assembly building to the silos via the missile transporter. The average distance between the missile assembly building and the silos was used for the analysis (average distance = approximately 1 mile). The missile transporter would return to the missile assembly building after all deliveries are complete. For transport of 60 interceptors, the total roundtrip distance was estimated to be 120 miles. The site grading activity phase was used to calculate emissions from transport of the interceptors.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000017
SO_x	0.000001
NO_x	0.000330
CO	0.000198
PM 10	0.000005

Pollutant	Total Emissions (TONs)
PM 2.5	0.000005
Pb	0.000000
NH_3	0.000004
CO_2e	0.2

18.1 Site Grading Phase

18.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 0
Number of Days: 1

18.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 20
Amount of Material to be Hauled Off-Site (yd^3): 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Site Grading Default Settings

Default Settings Used: No

Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20

Average Hauling Truck Round Trip Commute (mile): 120

- 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): 0

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

18.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- 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	000.218	000.001	000.111	004.357	000.004	000.004		000.024	00299.370
LDGT	000.227	000.001	000.186	004.730	000.006	000.005		000.025	00387.955
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LDDT	000.104	000.001	000.119	001.905	000.003	000.003		000.008	00347.778
HDDV	000.130	000.004	002.496	001.500	000.041	000.037		000.032	01267.047
MC	001.822	000.001	000.703	012.902	000.017	000.015		000.054	00390.897

18.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * 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)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

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

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Appendix D: List of Preparers

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This Programmatic Environmental Assessment/Overseas Environmental Assessment (PEA/OEA) has been prepared under the direction of the Missile Defense Agency (MDA), in cooperation with the United States (U.S.) Department of the Air Force (DAF) and the U.S. Department of the Army (DA). The following individuals were responsible for managing the development of this PEA/OEA and/or provided information and technical assistance toward the document preparation:

- Dr. Buff Crosby, Director, Environmental Management, MDA
- Jamey Elliott, Environmental Specialist, MDA NGI Project Lead
- Jane Argentina, Biologist, MDA
- Tina Lemmond, Civil/Environmental Engineer, MDA Contractor Support
- Tanya Simmons, Environmental Scientist, MDA Contractor Support
- Lana Partridge, Environmental Management Specialist, MDA Contractor Support
- Ron A. Crofford, Chief, Environmental Division, U.S. Army Garrison Alaska
- Leopold Palmer, Chief, Environmental Compliance Branch, U.S. Army Garrison Alaska
- Justin L. Hogrefe, Physical Scientist/Program Manager, U.S. Army Garrison Alaska – Fort Greely
- Tiffany Whitsitt-Odell, Environmental Planner, 30 CES/CEIEA, Vandenberg Space Force Base
- Stacy Maher, NGI Project Manager, United States Army Corps of Engineers (USACE)
- Matthew Johnson, Program Manager, USACE

This PEA/OEA was prepared by HDR Engineering, Inc., under the direction of MDA, in cooperation with the DAF and DA. Those individuals who contributed to the preparation of this document are listed below:

Anna Kohl, CEP, Project Manager
B.A. Geology
Years of Experience: 22

Nora Hotch, Deputy Project Manager
B.A. Biology
Years of Experience: 20

Tina Adair, Technical Editor
B.S. Communications
Years of Experience: 36

Alena Gerlek, Environmental Impact Analysis
B.A. Biological Sciences
Years of Experience: 12

Carolyn Hein, Air Quality Analysis
B.S. Environmental Science
Years of Experience: 3

Kathy Lemberg, GIS Analysis
B.A. Anthropology
Years of Experience: 15

Cindy Liles, Air Quality Analysis
B.S. Environmental Sciences
M.S. Environmental Engineering
Years of Experience: 12

Rory McAllister, Stakeholder Outreach
B.A. Communications
Years of Experience: 3

Pat Terhaar, PG, Senior NEPA Specialist
B.S. Earth Sciences
M.S. Geology
Years of Experience: 36

Ryan Thompson, Senior Advisor
B.S. Environmental Policy
Years of Experience: 19

Deborah Peer, Noise Analysis
B.S. Wildlife Science
B.S. Zoology
M.S. Environmental Science and Management
Years of Experience: 19

Steven Peluso, CHMM, CPEA, Air Quality Analysis
B.S. Chemical Engineering
Years of Experience: 34

Beniamino Volta, RPA, Cultural Resources Analysis
B.A. Human Ecology
M.A. Anthropology
Years of Experience: 20