Final
Environmental Assessment Minuteman III and Peacekeeper Silo Elimination

Malmstrom AFB, Montana
F.E. Warren AFB, Wyoming
Vandenberg AFB, California

May 2013

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14. ABSTRACT
This EA evaluates the potential environmental impacts associated with the dismantlement of 50 Minuteman III Intercontinental Ballistic Missile (ICBM) Launch Facilities (LFs) and five Missile Alert Facilities (MAFs) assigned to Malmstrom AFB, WY; 50 Peacekeeper ICBM LFs and 5 MAFs assigned to F.E. Warren AFB, MT; and three Minuteman III and one Peacekeeper test LFs at Vandenberg AFB, CA.

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FINDING OF NO SIGNIFICANT IMPACT
MINUTEMAN III AND PEACEKEEPER MISSILE SILO ELIMINATION
MALMSTROM AFB, MONTANA; F.E. WARREN AFB, WYOMING; AND
VANDENBERG AFB, CALIFORNIA

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 United States Code (U.S.C.) 4321 to 4270d, implementing Council on Environmental Quality (CEQ) Regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, Environmental Impact Analysis Process, the U.S. Air Force (Air Force) assessed the environmental consequences associated with the proposed dismantlement of 50 Minuteman III Intercontinental Ballistic Missile (ICBM) Launch Facilities (LFs) and five Missile Alert Facilities (MAFs) assigned to Malmstrom Air Force Base (AFB), Montana; 50 Peacekeeper ICBM LFs and five MAFs assigned to F.E. Warren AFB, Wyoming; and three Minuteman III and one Peacekeeper test LFs at Vandenberg AFB, California.

The dismantlement of the LFs is being conducted to meet the requirements of the New Strategic Arms Reduction Treaty (START), which entered into force on February 5, 2011. The need for this action was determined by the President of the United States; the Secretary of Defense; the Joint Chiefs of Staff; and the Commander, U.S. Strategic Command. This Environmental Assessment (EA) addresses the reduction in launch facilities required to meet U.S. treaty obligations under the New START. Under the treaty provisions, the compliance deadline for silo dismantlement is February 4, 2018.

Two alternatives are discussed in the attached EA, the proposed action (described briefly below) which includes two alternative dismantlement methods, and the "no action" alternative.

PROPOSED ACTION (PREFERRED ALTERNATIVE)

The proposed action is the elimination of 50 Minuteman III silos assigned to Malmstrom AFB, Montana; 50 Peacekeeper silos assigned to F.E. Warren AFB, Wyoming; and also the elimination of three Minuteman III and one Peacekeeper test silos at Vandenberg AFB, California. The Malmstrom AFB and F.E. Warren AFB silos are currently empty due to earlier compliance with the Strategic Arms Reduction Treaty (START) II, as modified by the Helsinki Agreement of September 1997. In addition, though dismantlement of the MAFs associated with the missile silos being eliminated in Montana and Wyoming is not required by treaty, once the associated missile silos are dismantled, the MAFs serve no useful purpose, and thus the impacts of eliminating the MAFs as a part of the proposed action were also analyzed in the EA.

In accordance with New START, the LFs are subject to inspection within the first 30 days of the notification, must remain visible to national technical means of verification (e.g., satellite imagery) during the entire dismantlement process, and remain open for a 60-day period following dismantlement of the headworks to allow Russia the opportunity to confirm that the LF has been dismantled. After the 60-day observation/verification period, the remainder of the silo will be filled and the site graded to meld with existing site contours. Existing security fencing would remain in place.

Two alternative methods of dismantlement are analyzed. The selection of the specific method of dismantlement will be at the option of the contractor and in accordance with the environmental protection measures discussed within the EA:

Explosive Implosion -- Under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). The silo would be completely filled with the resulting debris and with earth or gravel following the 60-day observation period. The silo door may be dismantled or destroyed with the debris placed into the silo, or the silo door may be removed and buried on-site within the fenced LF compound.

Backfill -- Under the Backfill Alternative, the silo door would be removed, dismantled, or destroyed and the silo would be completely filled with the resulting debris and with earth or gravel following the 60-day observation period. The silo door may also be removed and buried on-site within the fenced LF compound. In addition to filling the LF, the Launch Facility Support Building would also be filled with earth or gravel.

The underground portions of the associated MAFs would not be dismantled using Explosive Implosion, but will be backfilled using concrete and clean fill as described in the attached EA. The surface facilities, including structures and security fencing, will remain in place.

NO-ACTION ALTERNATIVE

Under the No Action Alternative, no dismantlement activities would occur, and consequently, as discussed in the EA, no impacts to the environment would occur. Compliance with the provisions of the New START would not be achieved, resulting in the failure of the United States to fulfill its treaty obligations.

SUMMARY OF FINDINGS

The attached EA, as incorporated by reference into this finding and attached hereto, analyzes the potential environmental consequences of activities associated with the dismantlement activities.

Per the requirements of 32 CFR § 989.22(c), the EA provides mitigations to reduce adverse environmental impacts to a level of insignificance in lieu of preparing an Environmental Impact Statement (EIS). The specific mitigations relied upon to reduce impact to a level of insignificance to support this finding are found in Table 2-3 in the attached EA. Identified mitigations will be further addressed in a mitigation plan developed in accordance with 32 CFR § 989.22(d).

FINDING OF NO SIGNIFICANT IMPACT

Based on my review of the facts and analyses contained in the attached EA, conducted under the provisions of NEPA, CEQ Regulations, and 32 CFR Part 989, I conclude that implementation of the Proposed Action (Preferred Alternative) with incorporation of appropriate mitigations identified in the EA and referenced in this FONSI, will not have a significant effect on human health or the natural environment; therefore, an environmental impact statement is not required.

MAJOR GENERAL EVERETT H. THOMAS
Vice Commander
Air Force Global Strike Command

26 April 2013
Date

Attachment:
FINAL ENVIRONMENTAL ASSESSMENT (March 2013)
MINUTEMAN III AND PEACEKEEPER SILO ELIMINATION
MALMSTROM AFB, MONTANA; F.E. WARREN AFB, WYOMING; VANDENBERG AFB, CALIFORNIA

FINAL

ENVIRONMENTAL ASSESSMENT

MINUTEMAN III AND PEACEKEEPER SILO ELIMINATION

MALMSTROM AFB, MONTANA
F.E. WARREN AFB, WYOMING
VANDENBERG AFB, CALIFORNIA

May 2013

COVER SHEET

ENVIRONMENTAL ASSESSMENT
MINUTEMAN III AND PEACEKEEPER SILO ELIMINATION
MALMSTROM AFB, MONTANA; F.E. WARREN AFB, WYOMING; AND VANDENBERG AFB, CALIFORNIA

a. Lead Agency: U.S. Air Force

b. Proposed Action: Minuteman III and Peacekeeper Silo Elimination, Malmstrom Air Force Base (AFB), Montana; F.E. Warren AFB, Wyoming; and Vandenberg AFB, California.

c. Written comments and inquiries regarding this document should be directed to: Lt. Colonel Eric Warner, Air Force Global Strike Command, AFGSC/A7NR, 841 Fairchild Avenue, Barksdale AFB, LA 71110.

d. Designation: Environmental Assessment (EA)

e. Abstract: This EA evaluates the potential environmental impacts associated with the proposed dismantlement of 50 Minuteman III Intercontinental Ballistic Missile (ICBM) Launch Facilities (LFs) and five Missile Alert Facilities (MAFs) assigned to Malmstrom AFB; 50 Peacekeeper ICBM LFs and 5 MAFs assigned to F.E. Warren AFB; and three Minuteman III and one Peacekeeper test LFs at Vandenberg AFB.

The alternative silo dismantlement options include explosive implosion and backfilling. The No-Action Alternative was also evaluated in order to establish the current baseline environmental conditions.

Under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). The silo would be completely filled with the resulting debris and earth or gravel. Under the Backfill Alternative, the silo door would be removed, dismantled, or destroyed and the silo would be completely filled with the resulting debris and with earth or gravel. Under the No-Action Alternative, no dismantlement activities would occur; the 104 missile silos and associated MAFs would remain in their current caretaker status.

All environmental resources were analyzed in this EA; however, only the environmental resources potentially affected by the Proposed Action and alternative were analyzed in-depth, including land use/aesthetics, hazardous materials management, hazardous waste management, Environmental Restoration Program sites, asbestos-containing material, lead-based paint, polychlorinated biphenyls, ordnance, soils and geology, water resources, air quality, noise, biological resources, cultural resources, and environmental justice. Based on the analysis of the Proposed Action and alternatives, the Air Force has determined that no significant impacts would occur.

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LIST OF ACRONYMS/ABBREVIATIONS

ACM	asbestos-containing material
Advisory Council	Advisory Council on Historic Preservation
AFB	Air Force Base
AFGSC	Air Force Global Strike Command
AFI	Air Force Instruction
AFOSH	Air Force Occupational Safety and Health
AHERA	Asbestos Hazard Emergency Response Act
AIRFA	American Indian Religious Freedom Act
AOC	Area of Concern
ARM	Administrative Rules of Montana
AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylebenzene, and xylene
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CCR	California Code of Regulations
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH_4	methane
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
COC	Community of Comparison
CPSC	Consumer Product Safety Commission
CWA	Clean Water Act
CY	cubic yard
°F	degree Fahrenheit
dB	decibel
dBA	A-weighted sound levels
DEQ	Department of Environmental Quality
DNL	day-night average sound level
DOD	Department of Defense
DPR	Department of Parks and Recreation
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DTSC	Department of Toxic Substances Control
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
FEMA	Federal Emergency Management Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact

LIST OF ACRONYMS/ABBREVIATIONS
(Continued)

GHG	greenhouse gases
GRO	gasoline range organics
GSA	General Services Administration
GWP	global warming potential
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HFC	hydrofluorocarbon
HICS	Hardened Intersite Cable System
HMERP	Hazardous Materials Emergency Response Plan
HSR	Historic Structures Report
HVAC	heating, ventilation, and air conditioning
Hz	hertz
IC	institutional control
ICBM	Intercontinental Ballistic Missile
INRMP	Integrated Natural Resources Management Plan
lb/in^2	pounds per square inch
LBP	lead-based paint
LCC	launch control center
LCEB	launch control equipment building
LCSB	launch control support building
LEB	launcher equipment building
LF	Launch Facility
LFSB	launch facility support building
MAF	Missile Alert Facility
MCA	Montana Code Annotated
MCL	Maximum Contaminant Level
MDA	Missile Defense Agency
µg/g	micrograms per gram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
mg/L	milligrams per liter
MOA	Memorandum of Agreement
MPDES	Montana Pollutant Discharge Elimination System
MS	Missile Squadron
MW	Missile Wing
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_X	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System

LIST OF ACRONYMS/ABBREVIATIONS
(Continued)

ORC	oxygen release compound
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAH	polycyclic aromatic hydrocarbons
PBO	Programmatic Biological Opinion
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PFC	perfluorocarbon
P.L.	Public Law
$PM_{2.5}$	particulate equal to or less than 2.5 microns in diameter
PM_{10}	particulate equal to or less than 10 microns in diameter
POL	petroleum, oils, and lubricants
ppb	parts per billion
ppm	parts per million
PSRE	propulsion system rocket engine
QD	quantity distance
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROC	reactive organic compounds
ROI	region of influence
RV	re-entry vehicle
RWQCB	Regional Water Quality Control Board
SBCAPCD	Santa Barbara County Air Pollution Control District
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLBM	Sea-Launched Ballistic Missile
SO_2	sulfur dioxide
START	Strategic Arms Reduction Treaty
SVOC	semi-volatile organic compound
SWPPP	Storm Water Pollution Prevention Plan
TCLP	Toxic Characteristic Leaching Procedure
TDS	total dissolved solids
TPH-d/o	total petroleum hydrocarbons-diesel/organics
TPH-g	total petroleum hydrocarbons-gasoline
tpy	tons per year
TSCA	Toxic Substances Control Act
U.S.C.	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compound
W.S.	Wyoming Statute

1.0 PURPOSE OF AND NEED FOR ACTION

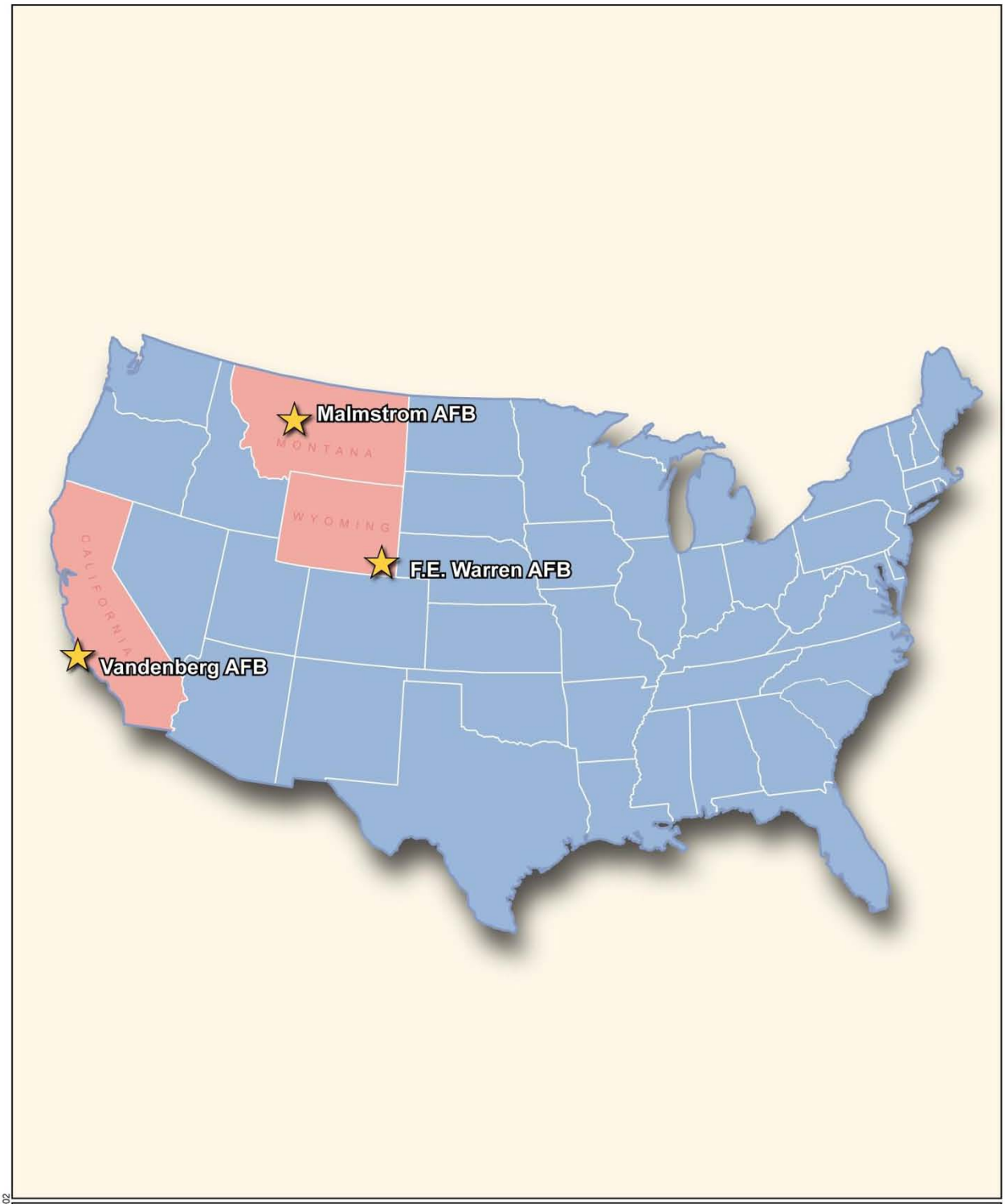
This environmental assessment (EA) evaluates the potential environmental impacts associated with the proposed dismantlement of 50 Minuteman III Intercontinental Ballistic Missile (ICBM) Launch Facilities (LFs) and five Missile Alert Facilities (MAFs) assigned to Malmstrom Air Force Base (AFB), Montana; 50 Peacekeeper ICBM LFs and five MAFs assigned to F.E. Warren AFB, Wyoming; and three Minuteman III and one Peacekeeper test LFs at Vandenberg AFB, California (Figure 1-1). Deactivation of 50 LFs and five MAFs at Malmstrom AFB and 50 LFs and five MAFs at F.E. Warren AFB equates to the inactivation of an entire missile squadron (MS) at each base.

This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S. Code [U.S.C.] 4321, et seq.), the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and Air Force policy and procedures (32 CFR Part 989).

1.1 PURPOSE AND NEED FOR ACTION

The purpose of this action is for Air Force Global Strike Command (AFGSC) to dismantle 103 deactivated LFs in order to meet the requirements of the New Strategic Arms Reduction Treaty (START) requirements, which entered into force on February 5, 2011. It should be noted that New START requirements include elimination of 103 ICBM LFs. There had been one additional LF at Vandenberg AFB (LF-07) that was originally included as part of the New START requirements; however, this LF was determined to have a warped launch tube making it inoperable; therefore, it was removed from the total number of LFs to be eliminated under New START. Dismantlement of LF-07 is included in the analysis as it may be programmed for dismantlement under a separate effort by the Air Force.

The need for this action was determined by the President of the United States; the Secretary of Defense; the Joint Chiefs of Staff; and Commander, U.S. Strategic Command that the bulk of reductions to meet New START requirements would come from the conversion or elimination of systems that were accountable under the 1991 START, but that are no longer used for a nuclear mission. This EA addresses the missile reductions during Phase I of meeting U.S. treaty obligations; specifically, the need to eliminate 50 empty Minuteman III silos assigned to Malmstrom AFB, Montana; 50 empty Peacekeeper silos assigned to F.E. Warren AFB, Wyoming; and to eliminate three Minuteman III and one Peacekeeper test silos at Vandenberg AFB, California. The elimination must be carried out in accordance with Protocol to the Treaty requirements (Treaty Part Three, Section III, paragraph 2 [a] – [c]) described below:



STARTSiloElimination\002

Silo Elimination Locations

Figure 1-1

(a) The silo door shall be removed, dismantled, or destroyed, and the silo headworks and the silo shall be destroyed by excavating them to a depth of no less than eight meters (26 feet) or by explosion to a depth of up to six meters (20 feet);

(b) The silo door shall be removed, dismantled, or destroyed and the silo shall be completely filled with debris resulting from demolition of infrastructure, and with earth or gravel. The silo door shall not be reinstalled; or

(c) Other procedures that are developed by the Party carrying out the elimination.

In accordance with New START, the LFs are subject to inspection within the first 30 days of the notification, must remain visible to national technical means of verification (e.g., satellite imagery) during the entire dismantlement process, and for a 60-day period following dismantlement of the headworks.

Compliance timetables placed a deadline of February 4, 2018 for treaty Parties to achieve the required strategic force levels directed by Article II of New START.

The New START Treaty entered into force February 5, 2011 and will remain in force for 10 years. Article II of the treaty mandates the number of strategic delivery vehicles and numbers of strategic warheads allowed through specified requirements. These limits must be met within seven years of entry into force. In response, the Department of Defense (DOD) has defined a baseline strategic force structure for planning purposes. This baseline strategic force structure would conform to New START requirements by retaining a specified number of deployed Sea-Launched Ballistic Missiles (SLBMs); deployed ICBMs; and deployed heavy bombers.

However, since the New START allows each Party to determine its own force structure, and to modify it over the period that the Treaty is in force, the United States would retain the right to modify this baseline force structure as appropriate throughout the period the Treaty remains in force. Therefore, any proposed action and decision on the final strategic force structure to comply with New START limits would likely not occur until near the end of the period it remains in force.

Throughout the treaty negotiations and force structure consideration, the United States took into account 104 missile silos and 42 heavy bombers that have been non-operational. Elimination of heavy bombers is covered by previously established procedures and has been analyzed in previous NEPA documentation. This EA addresses the elimination of 104 non-operational missile silos. Dismantlement of MAF structures is not part of New START requirements; however, because the associated MAFs would not be needed to support missile operations, dismantlement of the MAFs is included in this EA.

The 50 Peacekeeper LFs associated with F.E. Warren AFB and the 50 Minuteman III LFs associated with Malmstrom AFB are currently empty and were previously deactivated due to earlier compliance with START II, as modified

by the Helsinki Agreement of September 1997. Environmental Impact Analyses for these actions were previously completed (see Section 1.6). The three Minuteman LFs and the one Peacekeeper LF at Vandenberg AFB have also been deactivated. The deactivation process involved removal of the ICBMs and the removal of salvageable items from the LFs and MAFs. Classified items were recovered from the LFs and MAFs; office and living quarter items were recovered from the MAFs. The LFs and MAFs were put into caretaker status, which involved disconnecting utilities; draining fluids from the fueling, coolant, and hydraulic systems; and removing electrical filters, switches, and power supply batteries. Reusable equipment was placed in the supply system for use by other bases. Following deactivation activities, the site gates were secured.

This EA provides the Air Force decision-maker and the public with the information required to understand the potential environmental consequences of implementing the silo dismantlement alternatives or the No-Action Alternative.

1.2 LOCATION OF THE PROPOSED ACTION

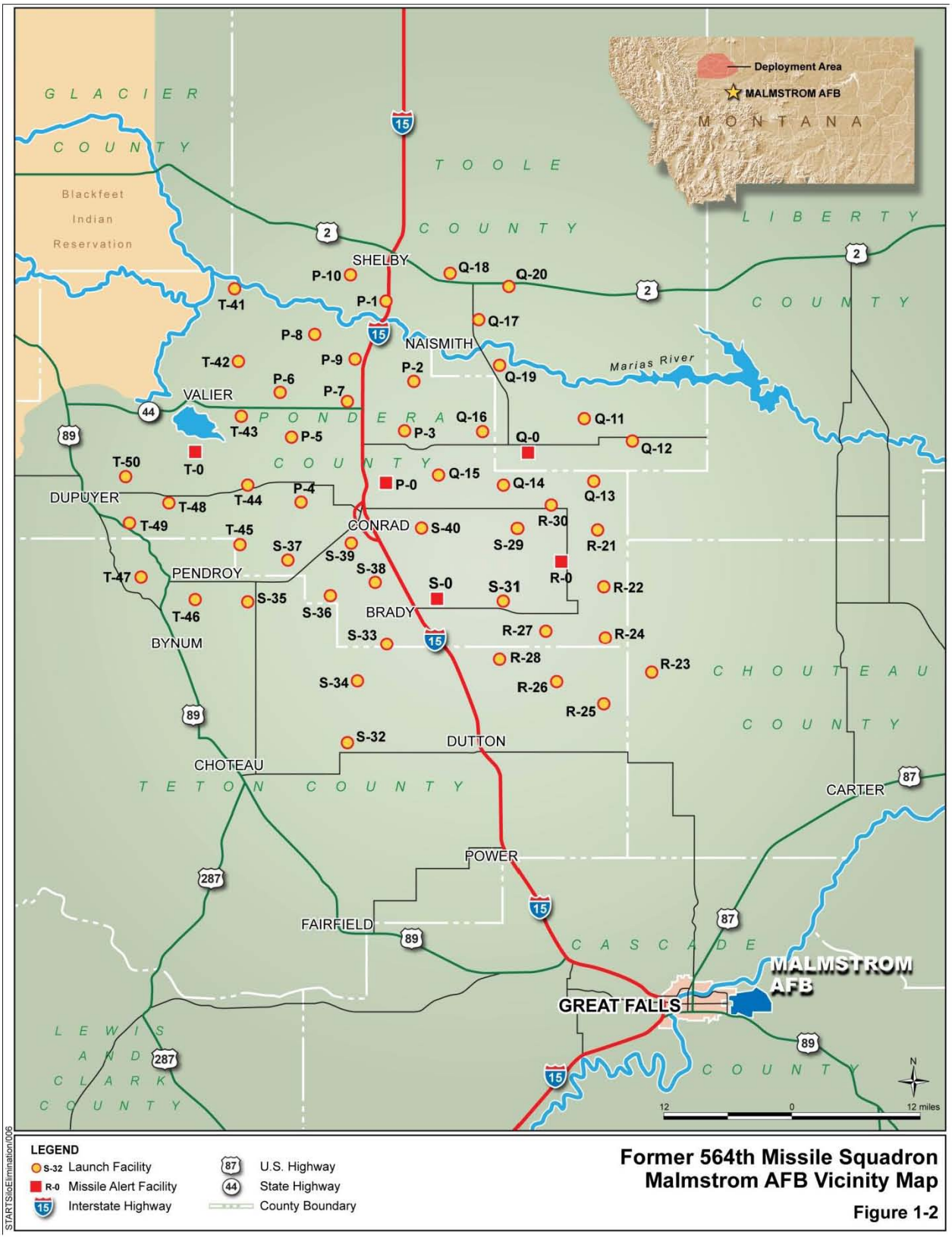
The 50 deactivated Minuteman III LFs and five associated MAFs comprising the former 564 MS are located near Malmstrom AFB, Montana in Toole, Pondera, Teton, and Chouteau Counties (Figure 1-2). Malmstrom AFB is located east of Great Falls, in north central Montana, approximately 120 miles south of the Canadian border, 200 miles east of the Idaho state border, and 220 miles north of the Wyoming state border. Great Falls is the closest populated area and has a population of approximately 58,500. Malmstrom AFB is part of AFGSC and is home to the 341st Missile Wing (MW). The 341 MW has three active missile squadrons, each with five MAFs and 50 LFs.

The 50 deactivated Peacekeeper LFs and five associated MAFs comprising the former 400 MS are located near F.E. Warren AFB, in southeastern Wyoming, in Laramie, Goshen, and Platte Counties (Figure 1-3). Cheyenne is the closest populated area and has a population of approximately 56,900. The Wyoming-Colorado border is 11 miles to the south, while the Wyoming-Nebraska border is about 40 miles to the east. Denver, Colorado is approximately 100 miles to the south. F.E. Warren AFB is part of AFGSC and is home to the 20th Air Force, Headquarters for the United States ICBM force. The host unit at F.E. Warren AFB is the 90 MW, which includes three active MSs, each with five MAFs and 50 LFs.

There are also three Minuteman test LFs and one Peacekeeper test LF located on the northern portion of Vandenberg AFB, California (Figure 1-4). Vandenberg AFB is located on the central coast of California, approximately 17 miles south of Santa Maria and 150 miles west, northwest of Los Angeles. Lompoc is the closest populated city with over 41,000 people. The four test LFs at Vandenberg AFB have been deactivated and are in caretaker status.

1.3 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

Consistent with the CEQ regulations, the scope of analysis presented in this EA is defined by the potential range of environmental impacts that would result from



LEGEND

- S-32 Launch Facility
- R-0 Missile Alert Facility
- 15 Interstate Highway
- 87 U.S. Highway
- 44 State Highway
- County Boundary

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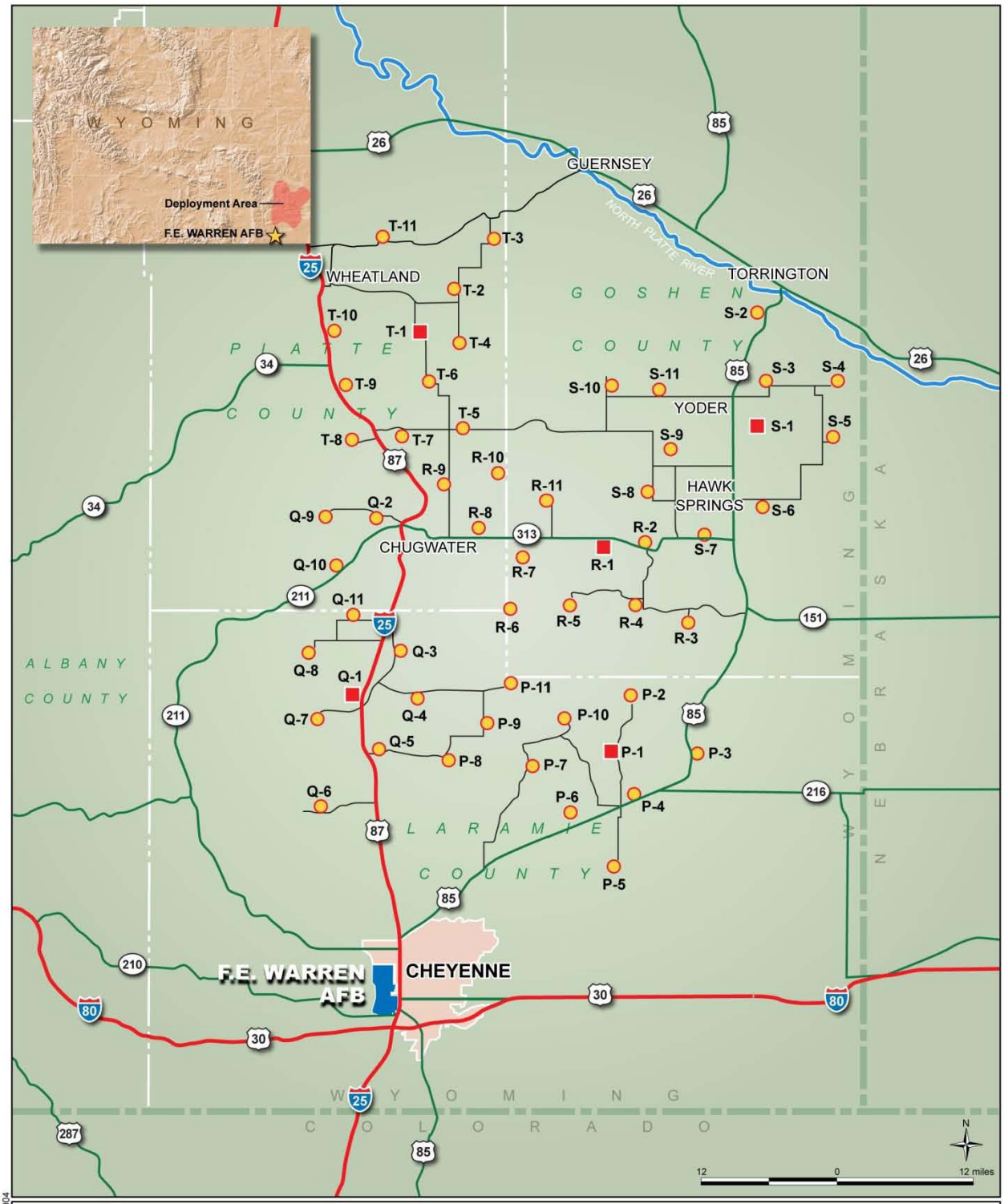
Former 564th Missile Squadron
Malmstrom AFB Vicinity Map

Figure 1-2



Former 400th Missile Squadron
F.E. Warren AFB Vicinity Map

Figure 1-3


SAN LUIS OBISPO COUNTY
GUADALUPE
Main St
101
SANTA MARIA
Betteravia
Broadway Ave
Rd
1
Cabrillo Hwy
LF-07
LF-06
LF-25
LF-05
ORCUTT
Clark
Ave
Black Rd
PACIFIC
OCEAN
101
1
1
S A N T A
135
B A R B A R A
VANDENBERG AFB
C O U N T Y
1
MISSION HILLS
246
246
LOMPOC
1
CALIFORNIA
VANDENBERG AFB
N
4
0
4 miles
LEGEND
LF-06 Launch Facility
101 U.S. Highway
1 State Highway
County Boundary
Note: LF-07 is not included in New START silo elimination action.
LF-07 is inoperable and may be dismantled by Vandenberg AFB.
Vandenberg AFB
Vicinity Map
Figure 1-4
START\SiloElimination\006

implementation of the Proposed Action or alternatives. This document is "issue-driven," in that it concentrates on those resources that may be affected by implementation of the Proposed Action or alternatives.

Resources that have a potential for impact were considered in detail in order to determine if implementing the Proposed Action or alternatives would have a significant impact on environmental resources. The resources analyzed in detail include land use/aesthetics, hazardous materials management, hazardous waste management, Environmental Restoration Program (ERP) sites, asbestos-containing material (ACM), lead-based paint (LBP), polychlorinated biphenyls (PCBs), ordnance, soils and geology, water resources, air quality, noise, biological resources, cultural resources, and environmental justice. The affected environment and the potential environmental consequences relative to these resources are described in Chapters 3.0 and 4.0, respectively.

Initial analysis of the proposed silo dismantlement options indicates that the dismantlement activities would not result in impacts to socioeconomics, transportation, utilities, airspace, storage tanks, pesticide usage, radon, radioactive materials, and medical/biohazardous waste. The reasons for not addressing these resources in detail are briefly discussed in the following paragraphs.

Socioeconomics. The LFs and MAFs associated with the Proposed Action have been deactivated and are currently being maintained in caretaker status. The socioeconomic impacts associated with silo deactivation (elimination of positions for officers, enlisted personnel, and civilians associated with the missile squadrons) have previously occurred. Therefore, additional drawdown of personnel and further socioeconomic effects to the region would not occur as part of the silo dismantlement effort; socioeconomic impacts are not expected and are not analyzed further in this EA.

Transportation. The LFs and MAFs associated with the Proposed Action have been deactivated and are currently being maintained in caretaker status. As a result, the Air Force no longer provides funding to state and county agencies to maintain the roads within these areas at a standard that allows all-weather access for large transport vehicles (i.e., payload transporter and transporter erector) that were required for missile maintenance activities. Funding for designated travel routes (paved and gravel roadways) within the former 564 MS has not been required since 2009 and within the former 400 MS since 2005. The impacts associated with elimination of road maintenance funding have previously occurred and additional reductions in road maintenance funding would not occur as part of the silo dismantlement effort. On-base roads at Vandenberg AFB would continue to be maintained by the Air Force. Dismantlement activities would be short-term and are not anticipated to result in a large increase in traffic at the sites (e.g., increased traffic from contractor vehicles and trucks hauling fill material). The silo dismantlement contractor would be responsible for maintaining and repairing any damage to roads resulting from operation of construction equipment during dismantlement activities. Therefore, transportation impacts are not anticipated and are not analyzed further in this EA.

Utilities. The LFs and MAFs associated with the Proposed Action have been deactivated and are currently being maintained in caretaker status. As a result, utility service to the LFs and MAFs has been disconnected. Utility service at one of the Vandenberg AFB LF locations (LF-06) is still available. Utility requirements during dismantlement activities would be supplied by the contractor in the form of portable generators, portable lavatories, and water trucks. Dismantlement activities would be short-term and are not anticipated to result in a requirement to reconnect utility service at the sites. The impacts associated with elimination of utility service have previously occurred and additional reductions in utility service would not occur as part of the silo dismantlement effort. Solid waste is not generated at the LF and MAF locations; any solid waste (excepting demolition debris to be placed in the silo) generated during dismantlement activities would be hauled away and disposed by the contractor. Prior to initiating dismantlement activities, the contractor would identify utility lines, water wells, etc. in the vicinity of the LF and MAF locations to ensure proposed dismantlement activities do not affect utility systems. Therefore, utilities impacts are not anticipated and are not analyzed further in this EA.

Airspace. There are no aircraft operations associated with the Proposed Action and no change to air space regulations is proposed. Therefore, airspace impacts are not expected and are not analyzed further in this EA.

Storage Tanks. Aboveground storage tanks (ASTs) at the LFs and MAFs have been removed or would be removed prior to dismantlement activities. Deep underground storage tanks (USTs) at the LFs and MAFs have been closed in place (i.e., slurry filled), shallow USTs have been removed. Sampling was conducted at the time of tank removal/closure to ensure no leaks had occurred; regulatory concurrence with tank closure has been received. Therefore, impacts from storage tanks are not expected and are not analyzed further in this EA.

Pesticide Usage. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. Sections 136-136y) regulates the registration and use of pesticides. Pesticide management activities are subject to federal regulations contained in 40 CFR Parts 162, 165, 166, 170, and 171. Pesticide/herbicide usage at Malmstrom AFB, F.E. Warren AFB, and Vandenberg AFB is coordinated by the respective Civil Engineering Pest Management Shops in accordance with their Integrated Pest Management Plans. Only Air Force-approved pesticides and herbicides may be utilized and only authorized and certified personnel are permitted to apply pesticides. Pest management personnel adhere to the label directions when handling pesticides/herbicides. The Pest Management Shops provided treatment (soil sterilants and contact herbicides) at LFs primarily to control vegetation for security purposes. Care is also taken not to affect neighboring agricultural lands around the LFs associated with Malmstrom AFB and F.E. Warren AFB. Typically, herbicide applications are not conducted at MAFs. Pesticide application to control insects or rodents is not conducted at LFs and MAFs.

The Proposed Action would result in a decrease in herbicide usage; therefore, impacts from pesticide usage are not expected and are not analyzed further in this EA.

Radon. Radon is a naturally occurring, colorless, and odorless radioactive gas produced by radioactive decay of naturally occurring uranium. Radon that is present in soil can enter a building through small spaces and openings, accumulating in enclosed areas such as basements. There are no federal or state standards regulating radon exposure at the present time.

The U.S. Environmental Protection Agency (EPA) has prepared a map of radon zones for the United States that assigns each county to one of three zones based on radon potential. Predicted indoor radon levels are highest in Zone 1 and lowest in Zone 3. Chouteau, Pondera, Teton, and Toole Counties (former 564 MS at Malmstrom AFB); Goshen, Laramie, and Platte Counties (former 400 MS at F.E. Warren AFB) and Santa Barbara County (Vandenberg AFB) are designated as Zone 1. Predicted average indoor radon levels in Zone 1 areas are greater than 4 pico Curies per liter (pCi/L) (U.S. Environmental Protection Agency, 2011). Although the LFs and MAFs are located in areas of high radon potential, following dismantlement, access to below ground areas would no longer be possible. Therefore, potential impacts from radon are not expected, and are not analyzed further in this EA.

Radioactive Materials. The test Minuteman III and Peacekeeper missiles launched from Vandenberg AFB were not armed with nuclear warheads. Although the Minuteman III and Peacekeeper ICBMs deployed within the former 564 MS and former 400 MS contained nuclear warheads at one time, no incidents of radiological release has occurred and no residual radiological contamination is present at the LF locations (AECOM, 2012b). Therefore, potential impacts from radioactive materials are not expected, and are not analyzed further in this EA.

Medical/Biohazardous Waste. Medical/biohazardous waste has not been generated at the LFs or MAFs and none would be generated under the Proposed Action or alternatives. Therefore, impacts from medical/biohazardous waste are not expected and are not analyzed further in this EA.

1.4 PUBLIC SCOPING

The Air Force is committed to planning future activities while considering environmental and community impacts and minimizing them where practical. The scoping process identifies the significant environmental issues relevant to the proposed silo dismantlement activities, and provides an opportunity for public involvement in the development of the EA. The scoping process is not required in the preparation of an EA; however, AFGSC decided it was appropriate to conduct meetings to inform the public of dismantlement activities. Notification of public scoping was made through local newspapers as well as press releases to local officials, media, and newspapers.

Public meetings were held on the following dates to solicit comments and concerns from the general public:

- December 5, 2011 at the Stage Stop Inn in Choteau, Montana
- December 6, 2011 at Norley Hall in Conrad, Montana
- December 7, 2011 at the Great Falls Civic Center in Great Falls, Montana
- December 8, 2011 at Shelby City Hall in Shelby, Montana
- January 10, 2012 at the Laramie County Library in Cheyenne, Wyoming
- January 11, 2012 at Torrington City Hall in Torrington, Wyoming
- January 12, 2012 at the Chugwater Community Center in Chugwater, Wyoming.

At each of these meetings, representatives of the Air Force were available to answer questions regarding the dismantlement effort as well as the process and purpose for the development of the EA. Oral and written comments were received during the scoping process (U.S. Air Force, 2012). These comments, as well as information from the local community, experience with similar decisions to be made, and NEPA requirements, were used to help determine the scope and direction of studies/analyses needed to accomplish this EA.

1.5 PUBLIC COMMENT PROCESS

The Draft EA was made available for public review and comment in April-May 2012. Copies of the Draft EA were made available for review in local libraries and provided to individuals and agencies listed in Chapter 8 of the EA. Comments were reviewed and addressed, when applicable, and have been included in their entirety in this document (Appendix B). Comments simply stating facts or opinions, although appreciated, did not require specific response.

In accordance with 32 CFR 989.15 (e) (2) (iv), the EA/FONSI was re-released for another 30-day public review in March-April 2013 as the EA/FONSI were revised to identify specific mitigation measures that would be implemented to reduce potential impacts to insignificance in lieu of preparing an EIS. No additional comments were received during the second review period.

1.5.1 Changes from the Draft EA to the Final EA

The text of this EA has been revised, when appropriate, to reflect concerns expressed in public comments. The major comments received on the Draft EA were:

- Update the listing of federally threatened and endangered species potentially present within the Wyoming counties that the LFs and MAFs are situated.

- The EA should discuss the procedures that would be followed should an active mountain plover nest be identified within the project site.

- If the LFs and MAFs are to be revegetated, the Wyoming Game and Fish Department recommended the use of native cool and warm season grass and forb species.

- Testing of archaeological sites in the vicinity of LFs at Vandenberg AFB was recommended.

- It was noted that a Memorandum of Agreement (MOA) between the Wyoming State Historic Preservation Officer (SHPO) and the Air Force is not yet in place.

- It was recommended that the Air Force use fill materials that are free of wastes.

- The potential effects of abandoning the Hardened Intersite Cable System (HICS) should be included.

Based on more recent studies or comments from the public, the following sections of the EA have been updated or revised:

- Section 1.1 has been revised to clarify that dismantlement of MAF structures is not part of New START requirements; however, because the associated MAFs would not be needed to support missile operations, dismantlement of the MAFs is included in the EA.

- Section 2.3 and 2.3.2 have been revised to clarify fill material would be obtained from established, commercial sources.

- Table 2-3 has been added to summarize environmental protection measures that would be implemented, as applicable, as parts of the dismantlement effort.

- Section 3.8.2.3 and Table 3,8-2 have been updated to incorporate the most recent listing of federally threatened and endangered species potentially present within Goshen, Laramie, and Platte counties where LFs and MAFs associated with the former 400 MS are situated.

- Section 4.8.2.1 has been revised to reflect the procedures that would be followed should an active mountain plover nest be identified within the project site.

- Chapter 2 has been revised to clearly indicate that the LF sites would be graded to meld with surrounding surface features (i.e., no revegetation is proposed at the LF sites).

- Section 3.9.1.3, 3.9.2.3, and 3.9.3.3 have been revised to clarify consultation with Native American tribes.

- Section 3.9.2.2 and Section 4.9.2.1 have been revised to clarify that a Programmatic Agreement (PA) between the Wyoming SHPO and the Air Force has been developed to document the accepted measures for the elimination of the Peacekeeper ICBM system.

- Sections 4.4.1, 4.4.2, 4.4.3, and 4.8 have been revised to discuss borrow pit locations, siting, and permit approval process through county and state agencies for acquisition of fill material in support of the dismantlement effort.

- Section 4.4.1.1 has been revised to clarify that fill material must be free of wastes.

- Section 4.6 has been revised to clarify fill truck haul emissions.

- Section 4.9.3.1 has been revised to clarify that a MOA between the California SHPO and the Air Force has been developed to document the accepted measures to reduce the adverse effect of dismantling Cold War-eligible resources to less than significant.

- Text has been added to Chapter 4 analysis discussions regarding the potential effects of abandoning the HICS cable in-place.

- Appendix B, Comments Received During Public Review, has been added to provide specific letters of comments received during the public review period.

- Appendix C, Consultation Letters, has been added to provide evidence of consultation with appropriate regulatory agencies during preparation of the EA.

1.6 RELATED ENVIRONMENTAL DOCUMENTS

The NEPA documents listed below have been prepared for similar actions to those being evaluated in this EA. These documents provided supporting information for the environmental analysis contained within this EA and are incorporated by reference.

Environmental Assessment for Minuteman III Missile System Deactivation, Malmstrom AFB, Montana (Malmstrom AFB, 2007a). This EA evaluated the potential impacts of deactivation of one of four Minuteman III missile systems based at Malmstrom AFB. After completion of phases 1, 2, and 3, the LFs and MAFs would be placed into caretaker status. The EA resulted in the signing of a Finding of No Significant Impact (FONSI).

Environmental Impact Statement for Peacekeeper Missile System Deactivation and Dismantlement, F.E. Warren AFB, Wyoming (F.E. Warren AFB, 2000). This environmental impact statement (EIS) evaluated the potential impacts of deactivating and dismantling 50 Peacekeeper LFs and five MAFs within the deployment area north and east of F.E. Warren AFB.

Environmental Impact Statement for Minuteman III Missile System Dismantlement, Grand Forks AFB, North Dakota (U.S. Air Force, 1999). This EIS evaluated the potential impacts of dismantling up to 150 Minuteman III LFs and 15 MAFs within the deployment area west of Grand Forks AFB.

Environmental Impact Statement for Deactivation of the Minuteman II Missile Wing at Whiteman Air Force Base, Missouri (U.S. Air Force, 1992). This EIS evaluated the potential impacts of deactivating and dismantling 150 Minuteman II LFs and 15 MAFs within the deployment area of Whiteman AFB.

Environmental Impact Statement for Deactivation of the Minuteman II Missile Wing at Ellsworth Air Force Base, South Dakota (U.S. Air Force, 1991). This EIS evaluated the potential impacts of deactivating and dismantling 150 Minuteman II LFs and 15 MAFs within the deployment area of Ellsworth AFB.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

This chapter describes the alternative dismantlement options for the silo elimination effort as well as the No-Action Alternative. The potential environmental impacts of the alternative dismantlement options and the No-Action Alternative are summarized in table form at the end of this chapter. The proposed silo elimination effort involves dismantlement of 50 Minuteman III LFs and five MAFs assigned to Malmstrom AFB, Montana; 50 Peacekeeper LFs and five MAFs assigned to F.E. Warren AFB, Wyoming; and three Minuteman III and one Peacekeeper test LFs at Vandenberg AFB, California. The dismantlement of these sites would bring the number of United States missiles in line with current New START requirements. The alternative dismantlement options for silo dismantlement and the No-Action Alternative are described briefly below, and in detail in the following sections:

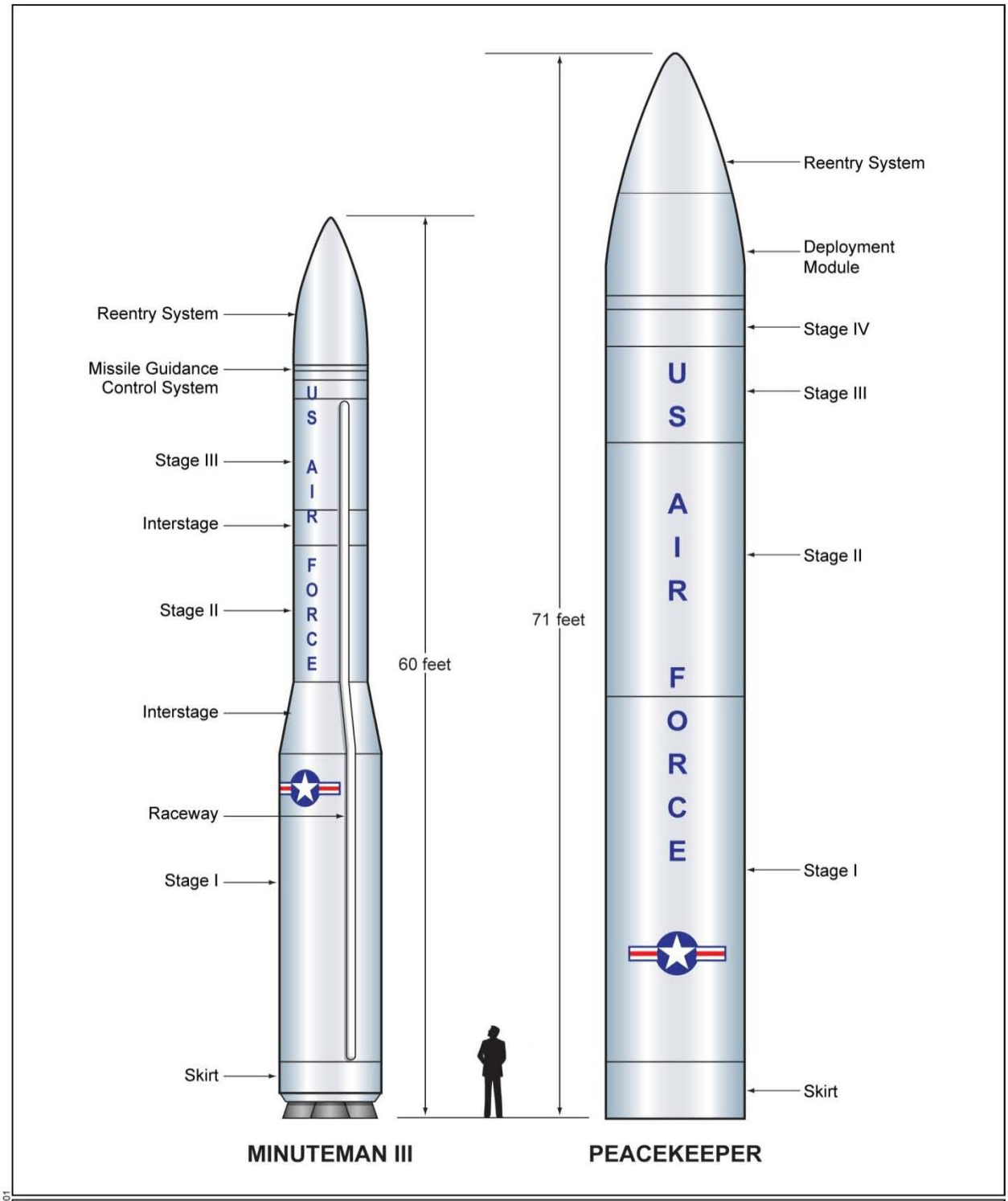
Explosive Implosion Alternative. Under this alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). The silo would be completely filled with the resulting debris and earth or gravel. The surface structures at the MAFs would remain; however, access to the subsurface facilities would be sealed off.

Backfill Alternative. Under this alternative, the silo door would be removed, dismantled, or destroyed and the silo would be completely filled with the resulting debris and with earth or gravel. The surface structures at the MAFs would remain; however, access to the subsurface facilities would be sealed off.

No-Action Alternative. Under the No-Action Alternative, no dismantlement activities would occur; the 104 missile silos and associated MAFs would remain in their current caretaker status.

2.1.1 Background

Minuteman III. Minuteman III missiles within the former 564 MS have been removed. The Minuteman III missile is a three-stage, solid propellant, inertially guided ICBM with a range of over 7,000 nautical miles. It has a length of 60 feet; a diameter of five feet, six inches; and weighs 79,432 pounds (Figure 2-1). Each Minuteman III missile silo consists of an unmanned, hardened underground launch facility approximately 80 feet deep, 12 feet in diameter, and covered by a 110-ton blast door. A launch facility support building (LFSB) buried approximately 40 feet below grade near the launch tube contains environmental control equipment and standby power sources (Figure 2-2). Within the former 564 MS, the LFSB is referred to as the launcher equipment building (LEB). LF sites are approximately one acre in size and are enclosed within a security fence. An electronic surveillance system is used at the LF to detect intruders.



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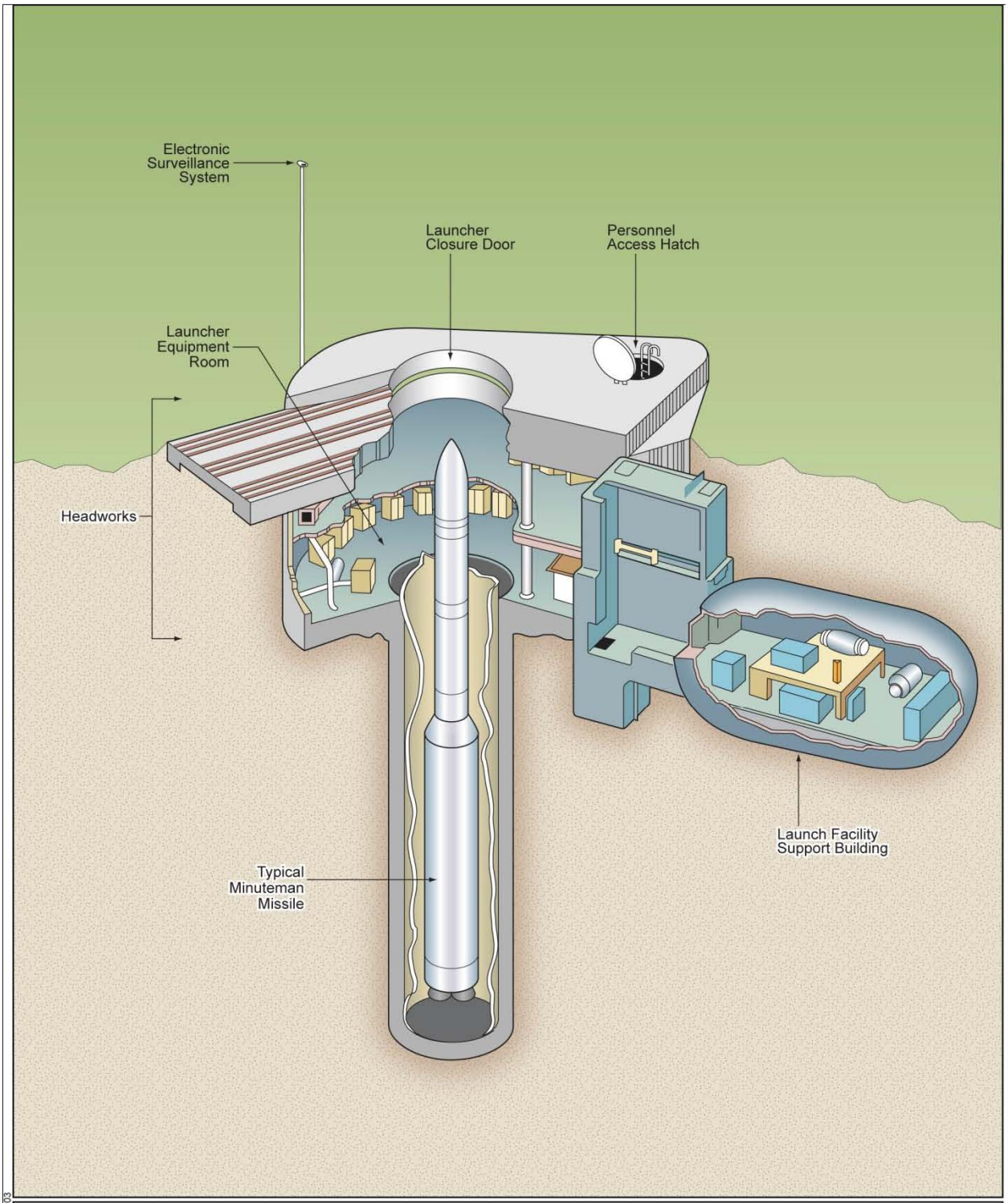
Minuteman III and Peacekeeper Missiles

Figure 2-1



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Launch Facility (LF)

Figure 2-2

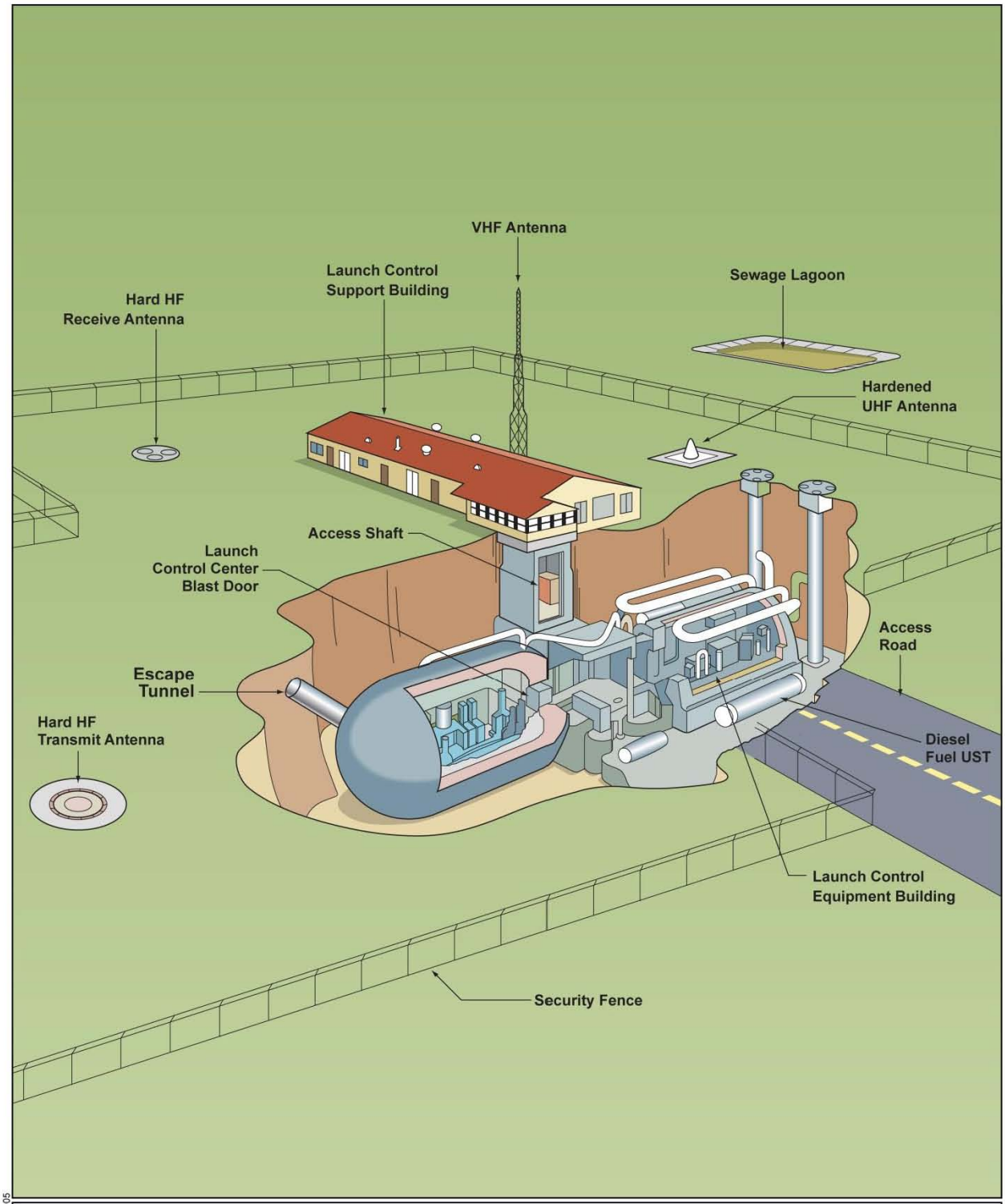
The Minuteman III missile silos are deployed in groups "flights" of ten missiles controlled by a single, centrally located MAF with a launch control center (LCC) manned by a Missile Combat Crew. The LCC contains the equipment needed by the crew to control and monitor the missiles and the LFs. Each LCC is buried at a depth of 40 to 100 feet below grade. The MAF topside structures contain living quarters and support equipment for the facility manager, chef, and security personnel. MAF sites are approximately five acres in size and are enclosed with a security fence (Figure 2-3). Outside of the MAF fenced area is a helicopter pad and a sewage lagoon (enclosed within a barbwire fence). As part of placing the MAFs in caretaker status, the sewage lagoons have been disabled and no longer serve as sewage holding basins. The former 564 MS is comprised of five flights (Papa, Quebec, Romeo, Sierra, and Tango) situated within parts of Chouteau, Pondera, Teton, and Toole counties in an area approximately 30 to 75 miles northwest of Malmstrom AFB (see Figure 1-2). Each LF is interconnected by a buried, Hardened Intersite Cable System (HICS) that connects them with the LCCs. The HICS provides an electrical connection between the missile facilities for operation and security purposes.

At Vandenberg AFB, LF-06, LF-07, and LF-25 are Minuteman launch facilities that are in caretaker status. These LFs are designed with a similar configuration to the LFs within the former 564 MS; however, the surface areas around the LFs are paved with asphalt, there are several security light poles surrounding the fenced compound, there is a 30-foot antenna structure within the compound, and LF-06 and LF-25 have a support structure within the fenced compound.

Peacekeeper. Peacekeeper missiles within the former 400 MS have been removed. The Peacekeeper missile is a four-stage, solid propellant, inertially guided ICBM with a range of over 7,000 nautical miles. The Peacekeeper missile has a length of 71 feet; a diameter of seven feet, eight inches; and weighs 195,000 pounds (see Figure 2-1). The description of a Peacekeeper LF and MAF is similar to that presented under Minuteman III.

The Peacekeeper missile silos are located within a deployment area north and east of F.E. Warren AFB. This system includes 50 LFs and five MAFs. The sewage lagoons associated with the MAFs have not yet been disabled. The former 400 MS is comprised of five flights (Papa, Quebec, Romeo, Sierra, and Tango) situated within parts of Goshen, Platte, and Laramie counties in an area approximately 10 to 50 miles north-northeast of F.E. Warren AFB (see Figure 1-3). The 10 LFs within a flight are directly connected to a MAF through a HICS. The HICS provides an electrical connection between the missile facilities for operation and security purposes.

At Vandenberg AFB, LF-05 is a Peacekeeper launch facility (converted Minuteman LF) that is in caretaker status. This LF is designed with a similar configuration to the LFs within the former 400 MS; however, the surface area around the LF is paved with asphalt and there are several security poles surrounding the fenced compound.



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Missile Alert Facility (MAF)

Figure 2-3

2.2 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action involves the dismantlement of 50 Minuteman III LFs and five MAFs within the former 564 MS associated with Malmstrom AFB, the dismantlement of 50 Peacekeeper LFs and 5 MAFs within the former 400 MS associated with F.E. Warren AFB, and the dismantlement of three Minuteman III and one Peacekeeper test LFs at Vandenberg AFB.

The HICS, which connects an LF to a MAF, would be abandoned in place with the Air Force retaining leases for the HICS corridors. Each HICS has marker posts (approximately three to five feet in height) that define the path of the cable. The landowners may remove the marker posts after the HICS system has been deactivated. Future use of the LF and MAF property is speculative and is beyond the scope of analysis in this EA.

Following dismantlement and grading activities at LF and MAF locations in Montana and Wyoming, real estate interests at these sites would be terminated. At Vandenberg AFB, the dismantled LFs would remain in Air Force possession. The disposal process is covered in Public Law (P.L.) 100-108, Section 235 (10 U.S.C. Section 9781).

Dismantlement activities would occur over a five-year period beginning in early to mid-2013. The silo dismantlement contractor would be responsible for maintaining and repairing any damage to roads resulting from operation of construction equipment during dismantlement activities. Final site grading activities would be completed no later than summer 2018 at launch facilities. Details of activities to occur during the dismantlement of the LFs and MAFs are provided below.

2.2.1 Launch Facilities (LF)

An LF consists of a launcher and an associated LFSB. All facilities are enclosed within a security fence. Each Minuteman III LF site averages approximately one acre in size. The interior of the LF is approximately 80 feet deep, with the top 28 feet comprising the headworks. Including concrete and steel, the headworks is approximately 25 feet wide and 33 feet deep. The launch tube is 12 feet in diameter below the headworks. Each Peacekeeper LF site averages approximately 1.6 acres in size. The interior of the LF is approximately 90 feet deep, with the top 28 feet comprising the headworks. Including concrete and steel, the headworks is approximately 25 feet wide and 33 feet deep. The launch tube is 12 feet in diameter below the headworks.

Previous deactivation activities included the removal of the missiles and salvageable items from the LFs. Fluids were drained from the fueling, coolant, and hydraulic systems, and electrical filters, switches, and power supply batteries were removed. Following deactivation activities, the gates were secured and each LF was placed in caretaker status.

LF dismantlement activities would include demolishing the headworks of each LF and LFSB and filling each LF and LFSB with debris and gravel or earth. The access to the LFSB associated with LFs within the former 564 MS would be capped rather than filled. A cathodic protection system at each LF would be abandoned in place. Each LF had a UST formerly used to store diesel fuel to power a back-up generator. Small ASTs for diesel fuel and lube oil were also located within each LFSB. The ASTs and USTs have been removed or closed-in-place by the Air Force in accordance with state and federal regulations. Various hazardous materials (e.g., fuels, oil, lubricants, coolants, filters, capacitors, and equipment containing PCBs) have been removed from the LFs.

2.2.2 Missile Alert Facilities (MAF)

A MAF is located within a fenced area averaging approximately five acres in size. Facilities are enclosed by a security fence, except for a sewage lagoon, helicopter pad, and a buried antenna consisting of two intersecting rings (each about four feet in diameter) buried four feet below surface. Topside structures include a launch control support building (LCSB) and a garage. Subsurface structures include a LCC and a launch control equipment building (LCEB).

Previous deactivation activities involved the removal of salvageable items from each of the MAFs. Classified items were recovered from the LCC, and office and living quarter items were recovered. Fluids were drained from the fueling, coolant, and hydraulic systems, and electrical filters, switches, and power supply batteries were removed. Sewage lagoons associated with the former 564 MS MAF locations have been dismantled and graded. Following deactivation activities, the gates were secured and each of the MAF sites were placed in caretaker status.

If ACM, LBP, or other hazardous material are identified in areas within the MAF proposed for dismantlement and cannot be avoided, removal and disposal would be conducted by a certified contractor in accordance with applicable federal, state, and local regulations. For surface structures at the MAF locations, the future property recipient would be informed of any ACM or LBP remaining and would be responsible for managing ACM and LBP in accordance with applicable regulations.

During dismantlement activities, the blast door to the LCC and the LCEB door would be welded shut. The elevator, elevator structure, controls, motor, and structural steel stairs, platforms, and supports would be removed from the elevator shaft. The vestibule in front of the LCC door and the entire elevator shaft and vestibule before the LCEB blast door would be filled with rubble, sand, gravel, and dirt. A reinforced concrete cap would be placed over the shaft to prevent settling and to deny access to the abandoned LCC structure. Air intakes and exhaust ducts would be filled and sealed with reinforced concrete.

For MAFs within the former 400 MS, the sewage lagoon contents, both liquids and sludge, would be sampled prior to dismantlement. The liquids would be properly handled, which may include discharging clean wastewater to the surface

following receipt and analysis of analytical laboratory data. Sludge disposal would also be dependent on analytical laboratory results. The demolition contractor would drain the lagoons, and level and grade the lagoons and berms for proper drainage.

The surface buildings at the MAF would not be demolished, but would be left as a part of the real property. Small surface antennas at the MAF would be removed. The LCC interior and walls of the LCSB were painted with LBP. Each MAF had a UST formerly used to store diesel fuel to power a back-up generator. Small ASTs for diesel fuel and lube oil were also located within each LCEB. The ASTs and USTs have been removed or closed-in-place by the Air Force in accordance with state and federal regulations. A cathodic protection system at each MAF would be abandoned in place. Various hazardous materials (e.g., fuels, oil, lubricants, coolants, filters, capacitors, and equipment containing PCBs) have been removed from the MAFs.

USTs and sub-surface concrete and steel at MAFs likely have a coating that contains PCBs. These coatings would be handled in accordance with federal and state requirements.

2.3 DESCRIPTION OF DISMANTLEMENT ALTERNATIVES

Selection of the silo dismantlement method is not limited to the alternatives described below; however, additional alternatives would require renegotiation by START partners. A delay caused by such negotiations would inhibit the ability to meet the compliance deadline for silo dismantlement of February 4, 2018. The alternatives described below would meet the established deadline under the established framework.

Within the Proposed Action, two silo dismantlement alternatives have been considered. These alternatives are discussed in the following subsections.

2.3.1 Explosive Implosion Alternative

Under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). The silo would be completely filled with the resulting debris and with earth or gravel. The silo door may be dismantled or destroyed with the debris placed into the silo, or the silo door may be removed and buried on-site within the fenced LF compound. For explosive demolition, everything above the floor of the LFSB, including the launcher closure door would be removed for salvage or become rubble. Concentric holes would be drilled vertically in the concrete of the headworks for the placement of explosives. To limit environmental impacts, the dismantlement design would produce specifications for explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The demolition contractor would be required to use the minimum amount of explosives necessary to implode the concrete and steel into the launch tube. The explosive implosion of each LF would be designed to prevent the ejection of large pieces of debris outward from the launch tube (e.g., use of blast mats). It is estimated that

the amount of rubble produced from destroying the upper 6 meters (20 feet) of the LF would be sufficient to fill the launch tube to the elevation of the former floor of the LFSB. In addition to the implosion of the LF, the LFSB would also be dismantled and filled with earth or gravel. Fill material would be hauled from established commercial borrow locations to the silo and placed into the silo and LFSB. Approximately 760 cubic yards (CYs) of clean earth or gravel would be used to backfill the LF and LFSB. Approximately 40 truck trips would be required to provide the earth or gravel to fill each silo and LFSB. The access to the LFSB associated with LFs within the former 564 MS would be capped rather than filled. A cap with a plastic liner would be placed above the dismantled LF to limit infiltration of precipitation into the launch tube. Blasting and safety plans would be developed and implemented prior to initiating explosive implosion activities.

Approximately 165 CYs of clean earth or gravel would be used to fill the LCC access at each MAF. Approximately 9 truck trips would be required to provide the earth or gravel to fill the MAF access.

At Vandenberg AFB, the implosion effort at LF-06 and LF-25 would include some support facility demolition. Due to the location of a support structure near each of these LFs, these structures would require demolition prior to initiating explosive implosion of the silos. The structure near LF-06 is a moveable shelter (building is on a track) that is approximately 3,000 square feet in area and 50-feet tall; the structure covers the silo door. The structure near LF-25 is a permanent building that was used for storage and is approximately 4,000 square feet in area. Vandenberg AFB maintains a program where facilities that are scheduled for demolition are actually deconstructed with most of the materials either being reused or recycled, minimizing the amount of debris that is disposed in a landfill.

In accordance with New START, the LFs are subject to inspection within the first 30 days of the notification, must remain visible to national technical means of verification (e.g., satellite imagery) during the entire dismantlement process, and remain open for a 60-day period following dismantlement of the headworks to allow Russia the opportunity to confirm that the LF has been dismantled. After the 60-day observation/verification period, the remainder of the silo would be filled and the site graded to meld with existing site contours. Existing security fencing would remain in place.

Table 2-1 presents a schedule for LF dismantlement; this schedule was developed for purposes of analysis only and does not represent an actual dismantlement timetable.

2.3.2 Backfill Alternative

Under the Backfill Alternative, the silo door would be removed, dismantled, or destroyed and the silo would be completely filled with the resulting debris and with earth or gravel following the 60-day observation period. The silo door may also be removed and buried on-site within the fenced LF compound. In addition to filling the LF, the LFSB would also be filled with earth or gravel.

Table 2-1. Assumed Silo Dismantlement Schedule

Years	Malmstrom AFB LF Dismantlement	F.E. Warren AFB LF Dismantlement	Vandenberg AFB LF Dismantlement
2013	25	0	0
2014	25	0	0
2015	0	25	0
2016	0	25	0
2017	0	0	4[(a)]

Note: (a) One of the four LFs at Vandenberg AFB (LF-07) is not subject to New START and may be dismantled under a separate project.
AFB = Air Force Base
LF = Launch Facility

Fill material would be hauled from established commercial borrow locations to the silo and placed into the silo and LFSB. Approximately 865 CYs of clean fill material would be required to fill each silo and LFSB. Approximately 45 truck trips would be required to provide the earth or gravel to fill each silo and associated LFSB. The access to the LFSB associated with LFs within the former 564 MS would be capped rather than filled. A cap with a plastic liner would be placed above the dismantled LF to limit infiltration of precipitation into the launch tube. The LF sites would be graded to meld with existing site contours and existing security fencing would remain in place.

Approximately 165 CYs of clean earth or gravel would be used to fill the MAF access. Approximately 9 truck trips would be required to provide the earth or gravel to fill the MAF access.

At Vandenberg AFB, the LF sites would be repaved to meld with existing site pavement and existing security fencing would remain in place. The backfilling of LF-06 and LF-25 would not require the demolition of the support structures near these LFs.

The schedule for completing the dismantlement effort under the Backfill Alternative would be the same as shown in Table 2-1; this schedule was developed for purposes of analysis only and does not represent an actual dismantlement timetable.

2.4 NO-ACTION ALTERNATIVE

Under the No Action Alternative, no dismantlement activities would occur; the 104 missile silos and associated MAFs would remain in their current caretaker status.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER STUDY

Two other silo dismantlement alternatives were considered but eliminated from further consideration.

New START allows for the dismantlement of silos by mechanical excavation to a depth of no less than eight meters (26 feet). However, due to the unnecessary additional environmental impacts associated with excavation (i.e., larger area of

disturbance, larger staging area required for equipment and excavation material, additional time needed to conduct mechanical demolition, and additional safety issues), this alternative was considered but eliminated from further analysis.

An alternative to utilize coal ash from the Malmstrom AFB heat plant as a possible fill material for LFs within the former 564 MS was considered. Coal ash waste includes fly ash, bottom ash, boiler slag, flue gas desulfurization gypsum, and other byproducts and contains low concentrations of arsenic, selenium, lead, and mercury. Coal ash is governed under the Resources Conservation and Recovery Act (RCRA) and is currently considered to be a non-hazardous waste under that law. Through a rulemaking process, the U.S. EPA is considering whether this designation should be changed. Depending on the rulemaking process, coal ash could be classified as a "special waste" under Subtitle C of RCRA. This designation would require regulations for the generation; transportation; and treatment, storage, or disposal of coal ash, along with related compliance and enforcement programs. Because coal ash contains various contaminants and the hazard classification of coal ash is in question, the use of this material as fill could result in the dismantled LFs being considered hazardous landfills. Therefore, this alternative was considered but eliminated from further analysis.

2.6 OTHER FUTURE ACTIONS IN THE REGION

Cumulative impacts result from "the incremental impact of actions when added to other past, present, and reasonably foreseeable future actions regardless of what agency undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (Council on Environmental Quality, 1978).

Future actions in the vicinity of the LFs and MAFs include continued agricultural and ranching activities, mining activities, and oil exploration (in Montana and Wyoming), and continuation of launch activities at adjacent LFs on Vandenberg AFB. These activities do not currently impact the sites and are not anticipated to conflict with proposed dismantlement activities. In Wyoming, a wind energy development is in the planning stages that would occupy a portion of the former 400 MS area. Specific details of the wind energy development are not yet available. No other major developments in the vicinity of the LFs and MAFs have been identified that would contribute to a cumulative impact.

2.7 COMPARISON OF ENVIRONMENTAL IMPACTS

Table 2-2 presents a comparative analysis of the silo dismantlement alternatives and No-Action Alternative for each resource (i.e., land use/aesthetics, hazardous materials management, hazardous waste management, ERP sites, ACM, LBP, PCBs, ordnance, soils and geology, water resources, biological resources, cultural resources, noise, air quality, and environmental justice) evaluated in this EA. A detailed discussion of potential effects is presented in Chapter 4.0, Environmental Consequences.

Table 2-2. Summary of Influencing Factors and Environmental Impacts
Page 1 of 6

Resource	Explosive Implosion Alternative	Backfill Alternative	No-Action Alternative
Land Use/Aesthetics	Impacts • There would be no significant impact from eliminating LFs and terminating Air Force use of surface structures at MAF locations • There would be no significant impact from relinquishing the 1,200 foot explosive QD easement around LFs • Land uses in the vicinity of the LFs and MAFs would likely continue as those uses that are currently occurring (e.g., farming, ranching, open space) • The aesthetic quality of the LF and MAF areas would not change Mitigation Measures • None	Impacts • Potential impacts to land use and aesthetics would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • There would be no significant impact to the LF and MAF property from the Air Force retaining and maintaining it in caretaker status Mitigation Measures • None
Hazardous Materials Management	Impacts • Hazardous materials are not stored or used at the LFs and MAFs • No significant impact from management of hazardous material during dismantlement activities in accordance with applicable regulations Mitigation Measures • None	Impacts • Potential impacts would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • Hazardous materials are not stored or used at the LFs and MAFs Mitigation Measures • None
Hazardous Waste Management	Impacts • Hazardous waste is not generated at the LFs and MAFs • No significant impact from management of hazardous waste generated during dismantlement activities in accordance with applicable regulations Mitigation Measures • None	Impacts • Potential impacts would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • Hazardous waste is not generated at the LFs and MAFs Mitigation Measures • None

Table 2-2. Summary of Influencing Factors and Environmental Impacts
Page 2 of 6

Resource	Explosive Implosion Alternative	Backfill Alternative	No-Action Alternative
Environmental Restoration Program Sites	Impacts • No significant impact from continued management of ERP sites in the vicinity of the LFs and MAFs according to Air Force DERA program and state requirements Mitigation Measures • None	Impacts • Potential impacts would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • No significant impact from continued management of ERP sites associated with LF and MAF locations in accordance with Air Force DERA program and state requirements Mitigation Measures • None
Asbestos-Containing Material	Impacts • No significant impact from management of ACM in accordance with applicable federal, state, and local regulations to minimize the potential risk to human health and the environment Mitigation Measures • None	Impacts • Potential impacts from ACM would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • No significant impact from the Air Force continuing to manage ACM in accordance with its own policy and applicable regulations Mitigation Measures • None
Lead-Based Paint	Impacts • No significant impact from management of LBP in accordance with applicable federal, state, and local regulations to minimize the potential risk to human health and the environment Mitigation Measures • None	Impacts • Potential impacts from LBP would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • No significant impact from the Air Force continuing to manage LBP in accordance with its own policy and applicable regulations Mitigation Measures • None
Polychlorinated Biphenyls	Impacts • Equipment containing PCBs has been removed from the LF and MAF locations • No significant impact from solid PCB coatings that have been evaluated and found to be non-soluble Mitigation Measures • None	Impacts • Potential PCB impacts would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • Equipment containing PCBs has been removed from the LF and MAF locations Mitigation Measures • None

Table 2-2. Summary of Influencing Factors and Environmental Impacts
Page 3 of 6

Resource	Explosive Implosion Alternative	Backfill Alternative	No-Action Alternative
Ordnance	Impacts • Ordnance items have been removed from the LFs • Impacts from use of ordnance during dismantlement activities in accordance with dismantlement design blast criteria would be insignificant • No significant impact from relinquishing the 1,200 foot explosive QD easement around LFs	Impacts • Potential impacts would be similar to those described under the Explosive Implosion Alternative	Impacts • Ordnance items have been removed from the LFs; therefore, no significant impacts would occur
	Mitigation Measures • None	Mitigation Measures • None	Mitigation Measures • None
Soils and Geology	Impacts • Compliance with Construction Site Storm Water NPDES permit and SWPPP and implementation of standard construction practices would reduce the potential for erosion effects to insignificant • No significant impact to erosion potential from covering disturbed areas with gravel or pavement once dismantlement activities are complete • Adequate sources of fill material are available in the region; therefore, no significant impact to fill material sources	Impacts • Potential geology and soils impacts would be similar to those described under the Explosive Implosion Alternative	Impacts • No soil disturbance would occur; therefore, no significant impact to geology and soils would occur
	Mitigation Measures • None	Mitigation Measures • None	Mitigation Measures • None
Water Resources	Impacts • Potential erosion effects would be insignificant through compliance with the Construction Site Storm Water NPDES permit and the SWPPP • Based on prior silo dismantlement efforts and regional geology, no significant impacts to groundwater resources are anticipated from controlled explosive implosion	Impacts • Potential water resources impacts would be similar to those described under the Explosive Implosion Alternative	Impacts • Dismantlement activities would not occur; therefore, no significant change to regional water resources would occur
	Mitigation Measures • None	Mitigation Measures • None	Mitigation Measures • None

Table 2-2. Summary of Influencing Factors and Environmental Impacts
Page 4 of 6

Resource	Explosive Implosion Alternative	Backfill Alternative	No-Action Alternative
Air Quality	Impacts • Dismantlement activities would result in insignificant short-term air quality impacts • Emissions would not hinder maintenance of the NAAQS or state air quality standards Mitigation Measures • None	Impacts • Potential air quality impacts would be similar to those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • Dismantlement activities would not occur; therefore, no significant change to regional air quality would occur Mitigation Measures • None
Noise	Impacts • Noise generated from dismantlement activities at the LF and MAF locations would be short-term and insignificant • Noise generated from explosive implosion would be a short-term, insignificant occurrence at each LF site • Once dismantlement activities are completed, future activities (e.g., equipment storage, vacant land) are not anticipated to generate a substantial amount of noise Mitigation Measures • None	Impacts • Noise generated from dismantlement activities at the LF and MAF locations would be short-term and insignificant • Once dismantlement activities are completed, future activities (e.g., equipment storage, vacant land) are not anticipated to generate a substantial amount of noise Mitigation Measures • None	Impacts • Dismantlement activities would not occur; therefore, no significant change to the noise environment would occur Mitigation Measures • None
Biological Resources	Impacts • Dismantlement activities may cause insignificant short-term impacts to wildlife • No significant impact to federally-listed plant and animal species as none are known to be present on the LF and MAF locations • Presence/absence surveys for species of concern potentially occurring in the region would be performed prior to initiating dismantlement activities to prevent significant impacts • No significant impact to jurisdictional wetlands and sensitive habitats as none are present at the LFs and MAFs Mitigation Measures • None	Impacts • Potential impacts to biological resources would be similar to those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • Dismantlement activities would not occur; therefore no impact to biological resources would occur Mitigation Measures • None

Table 2-2. Summary of Influencing Factors and Environmental Impacts
Page 5 of 6

Resource	Explosive Implosion Alternative	Backfill Alternative	No-Action Alternative
Cultural Resources	Impacts • No significant impact to prehistoric or historic archaeological properties or traditional resources within the LF and MAF areas associated with Malmstrom AFB and F.E. Warren AFB as none have been identified • No significant impact to archaeological sites and traditional resources at Vandenberg AFB, although some sites are situated in the vicinity of LF locations • LFs and MAFs have been determined to be eligible for listing on the National Register. No significant impacts are anticipated as measures stipulated in the MOA at Malmstrom AFB and the PA at F.E. Warren AFB have been coordinated with the appropriate SHPO • No significant impact to LFs at Vandenberg AFB are anticipated as they are the same as those documented in other parts of the United States; that documentation has been determined to be appropriate/ adequate to reduce potential effects to less than significant. Measures stipulated in the MOA for Vandenberg AFB have been coordinated with the California SHPO Mitigation Measures • Prepare HSR for MAF Q-1 in accordance with the National Park Service's Preservation Brief 43: The Preparation and Use of Historic Structures Reports	Impacts • Potential impacts to cultural resources would be similar to those described under the Explosive Implosion Alternative Mitigation Measures • Mitigation measures would be the same as those discussed under the Explosive Implosion Alternative	Impacts • There would be no significant impact to the LF and MAF property from the Air Force retaining and maintaining it in caretaker status • Dismantlement activities would not occur; therefore, no significant impacts to cultural resources are anticipated Mitigation Measures • None

Table 2-2. Summary of Influencing Factors and Environmental Impacts
Page 6 of 6

Resource	Explosive Implosion Alternative	Backfill Alternative	No-Action Alternative
Cultural Resources (continued)	• Retain ownership and responsibility for the Peacekeeper MAFs until mitigation strategies for the disposition of these sites can be determined through an amendment of the Programmatic Agreement. Possible future mitigation includes transfer of MAF Q-1 to the State of Wyoming for use as a museum and interpretive facility • Provide as-built drawings of the Peacekeeper LF and other pertinent historic documentation to the Wyoming SHPO • Maintain Building 486 (designated as Launch Facility Trainer U-02) to be open to the public at regularly scheduled times as an interpretive display • Prepare DPR 523 forms for LF-05, LF-06, and LF-07 at Vandenberg AFB • Prepare a brochure for Vandenberg AFB silos based on the DPR forms		
Environmental Justice	Impacts • No disproportionately high and adverse impacts to low income, minority, or youth populations have been identified Mitigation Measures • None	Impacts • Potential environmental justice impacts would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None	Impacts • Potential environmental justice impacts would be the same as those described under the Explosive Implosion Alternative Mitigation Measures • None

ACM = asbestos-containing material
AFB = Air Force Base
DERA = Defense Environmental Restoration Account
DPR = Department of Parks and Recreation
ERP = Environmental Restoration Program
HSR = Historic Structures Report
LBP = lead-based paint
LF = Launch Facility
MAF = Missile Alert Facility
MOA = Memorandum of Agreement
NAAQS = National Ambient Air Quality Standards
NPDES = National Pollutant Discharge Elimination System
PA = Programmatic Agreement
PCB = polychlorinated biphenyl
QD = quantity distance
SHPO = State Historic Preservation Officer
SWPPP = Storm Water Pollution Prevention Plan

The dismantlement effort would not result in significant adverse effects on the land or the surrounding area. However, best management practices, environmental protection measures, and other minimization measures would be implemented to eliminate or reduce the impacts of non-significant adverse effects. Table 2-3 presents a summary of mitigation measures that would be implemented, as applicable, as parts of the dismantlement effort.

Table 2-3. Mitigation Measures
Page 1 of 6

Environmental Protection Measure	Impact Reduction Benefit	Responsible Organization
Land Use/Aesthetics		
LFs to be graded to meld with existing site contours (paved at Vandenberg AFB). Structures at MAF locations to remain and not change the visual character of the area. **Vandenberg AFB.** Demolition of support structures at Vandenberg AFB would involve reuse and recycling of most building materials.	Maintain land use compatibility with surrounding land uses and visual character of the area. Minimize the amount of debris that is disposed in a landfill.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities
Hazardous Materials Management		
Management of hazardous materials during dismantlement activities in accordance with applicable regulations and established procedures.	Prevent/minimize the potential risk to human health and the environment.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities
Hazardous Waste Management		
Management of hazardous waste generated during dismantlement activities in accordance with applicable regulations. Any hazardous waste generated on the property would be disposed at an approved off-site location in accordance with applicable regulations.	Prevent/minimize the potential risk to human health and the environment.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities

Table 2-3. Mitigation Measures
Page 2 of 6

Environmental Protection Measure	Impact Reduction Benefit	Responsible Organization
Asbestos-Containing Material		
Management of ACM encountered during dismantlement activities in accordance with applicable federal, state, and local regulations. Appropriate safety protocols for site workers to be implemented.	Prevent/minimize the potential risk to human health and the environment.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities
Lead-Based Paint		
Management of LBP encountered during dismantlement activities in accordance with applicable federal, state, and local regulations. Appropriate safety protocols for site workers to be implemented.	Prevent/minimize the potential risk to human health and the environment.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities
Polychlorinated Biphenyls		
Management of PCBs encountered during dismantlement activities in accordance with applicable federal, state, and local regulations. Appropriate safety protocols for site workers to be implemented.	Prevent/minimize the potential risk to human health and the environment.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities

Table 2-3. Mitigation Measures
Page 3 of 6

Environmental Protection Measure	Impact Reduction Benefit	Responsible Organization
Ordnance		
Dismantlement contractor will prepare and implement a blasting and safety plan. Blasting activities will be supervised and performed by a qualified person in demolition blasting. The dismantlement design will specify limits on the explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The minimum amount of explosives necessary to implode the concrete and steel into the launch tube will be used. The explosive implosion will be designed to prevent the ejection of large pieces of debris outward from the launch tube.	Minimize risk to health and safety.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities
Soils and Geology		
Implement Construction Site Storm Water NPDES permit and associated SWPPP. Standard practices: • Add protective cover, such as mulch or straw, to exposed soil • Use of sediment control structures (e.g., silt fences) to minimize water-borne erosion • Watering soil stockpiles in dry conditions to minimize wind erosion • Implement site grading procedures that limit the time soils are exposed prior to being covered by impermeable surfaces or gravel • Implement storm water diversions to reduce water flow through exposed sites during dismantlement activities • Implement temporary impoundments to catch soil eroded from the site • Implement soil erosion plans in coordination with the local Natural Resources Conservation Service Soils used for fill material must be free of wastes and acceptable quality with engineering characteristics of minimal shrink/swell potential and adequate compaction capability, to minimize the potential for future subsidence.	Minimize increased rates of soils erosion, compaction, and changes in permeability.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities

Table 2-3. Mitigation Measures
Page 4 of 6

Environmental Protection Measure	Impact Reduction Benefit	Responsible Organization
Water Resources		
Implement Construction Site Storm Water NPDES permit and associated SWPPP. Minimize surface runoff using standard construction practices identified under Soils and Geology.	Minimize soil erosion and changes to surface topography. Protect the quality of any surface water, groundwater, and natural environment through which they flow.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities
Noise		
Blasting will be supervised and performed by qualified individuals experienced in demolition blasting. Blast-induced ground vibrations will not exceed a peak ground particle velocity of 0.075 inch per second at frequencies less than 40 Hz nor 2.0 inches per second at frequencies of 40 Hz or greater. The maximum airblast sound level will not exceed 134 dB at a distance of 500 feet. Flying debris from blasting will not travel beyond the fenced area of the LF. Ground vibration and airblast noise will be monitored during implosion activities. Blasting and safety plans will include provisions for modifying blasting techniques to satisfy stringent limits if houses or structures are located close to demolition sites; this will reduce the intensity of the airblast and ground vibration.	Minimize health and safety risks. Reduce noise from blasting that induce vibrations to a level that will minimize physical damage to structures or annoyance of nearby residents. Reduce the intensity of the airblast and ground vibration to minimize effects to humans, biota, and structures. Reduction of noise impacts that would cause shaking of houses/structures, rattling of windows, damages from demolition blast and annoyance of nearby residents.	Construction contractor overseen by: 30 CES for Vandenberg AFB dismantlement activities 90 CES for F.E. Warren AFB dismantlement activities 341 CES for Malmstrom AFB dismantlement activities

Table 2-3. Mitigation Measures
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Environmental Protection Measure	Impact Reduction Benefit	Responsible Organization
Biological Resources		
F.E. Warren AFB If dismantlement activities are planned during mountain plover nesting (April 10 - July 10), a pre-construction bird survey would be conducted within three days prior to such activity. If an active nest is identified within the project site, proposed dismantlement activities would be delayed 37 days, or seven days post-hatching. If flightless chicks are observed, dismantlement activities would be delayed at least seven days.	Protection and propagation of subject species and wildlife.	Construction contractor overseen by: 90 CES
Vandenberg AFB Conduct explosive implosion activities during high tide to further limit or minimize potential startle effects to marine mammals that haul out on Vandenberg AFB beaches.	Protection and propagation of subject species and wildlife.	Construction contractor overseen by: 30 CES
Prior to initiating dismantlement activities, a qualified biologist would inspect the LFs and any adjacent buildings to determine whether bats are roosting. If bats are present, passive exclusion would be conducted (prior to start of maternity season in May) to allow bats to leave but prevent their return.	Protection and propagation of subject species and wildlife.	Construction contractor overseen by: 30 CES
Cultural Resources		
F.E. Warren AFB Prepare HSR for MAF Q-1. The HSR shall be completed in accordance with the National Park Service's Preservation Brief 43: The Preparation and Use of Historic Structures Reports.	Reduce adverse effects to historic properties to less than significant.	90 CES
Retain ownership and responsibility for the preservation of the five existing Peacekeeper MAFs until mitigation strategies for the disposition of these sites can be determined through an amendment of the Programmatic Agreement. Possible future mitigation includes transfer of MAF Q-1 to the State of Wyoming for use as a museum and interpretive facility.	Reduce adverse effects to historic properties to less than significant.	90 CES
Provide as-built drawings of the Peacekeeper LF and other pertinent historic documentation to the Wyoming SHPO	Reduce adverse effects to historic properties to less than significant	90 CES
Maintain Building 486 (designated as Launch Facility Trainer U-02) to be open to the public at regularly scheduled times as an interpretive display.	Reduce adverse effects to historic properties to less than significant	90 CES

Table 2-3. Mitigation Measures
Page 6 of 6

Environmental Protection Measure	Impact Reduction Benefit	Responsible Organization
Cultural Resources (Continued)		
Vandenberg AFB Prepare California DPR 523 forms for LF-05, LF-06, and LF-07. Recordation would include photographic documentation of the three properties prior to demolition and photos of the demolition using high-resolution digital cameras.	Reduce adverse effects to historic properties to less than significant.	30 CES
Prepare a brochure based on the DPR summary forms, photography, and other applicable information.	Reduce adverse effects to historic properties to less than significant.	30 CES
Maintain a Native American monitor on site during ground-disturbing activities.	Continue collaboration with Native American Tribes ensuring no adverse effects to traditional cultural resources.	30 CES

ACM = asbestos-containing material
AFB = Air Force Base
CES = Civil Engineering Squadron
dB = decibel
DPR = Department of Parks and Recreation
Hz = hertz
HSR = Historic Structures Report
LBP = lead-based paint
LF = Launch Facility
MAF = Missile Alert Facility
NPDES = National Pollutant Discharge Elimination System
PCB = polychlorinated biphenyl
SWPPP = Storm Water Pollution Prevention Plan

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing environmental conditions within the area potentially affected by proposed dismantlement activities. It provides information to serve as a baseline from which to identify and evaluate potential environmental changes resulting from implementing dismantlement actions. The environmental components addressed include relevant natural or human environments likely to be affected by the Proposed Action and alternatives.

Initial analysis of the proposed silo dismantlement options indicated that the dismantlement activities would not result in impacts to socioeconomics, transportation, utilities, airspace, storage tanks, pesticide usage, radon, radioactive materials, and medical/biohazardous waste. Based upon the nature of the activities that would occur under the proposed silo dismantlement options and No-Action Alternative, it was determined that the potential exists for the following resources to be affected or to create environmental effects: land use and aesthetics, hazardous materials management, hazardous waste management, ERP sites, ACM, LBP, PCBs, ordnance, soils and geology, water resources, air quality, noise, biological resources, cultural resources, and environmental justice.

The region of influence (ROI) to be studied will be defined for each resource area affected by the proposed activities. The ROI determines the geographical area to be addressed as the Affected Environment.

3.2 LAND USE AND AESTHETICS

3.2.1 Malmstrom AFB

The ROI for land use is the area of and immediately adjacent to each of the LFs and MAFs within the former 564 MS area. The ROI for aesthetics is the area containing views of these facilities.

3.2.1.1 Land Use.

Land within the former 564 MS area is generally rural. This area is sparsely populated, and most communities are small with exceptions such as the cities of Conrad, Choteau, and Shelby. However, no LFs or MAFs are situated within or adjacent to communities. LFs and MAFs are situated in undeveloped areas that consist of cropland, grazed rangeland, or grassland.

Each LF and MAF is a secured, military facility. There are 50 LFs and five MAFs within the former 564 MS area. Each LF is approximately 1 acre in area, and the MAFs are approximately 5 acres in area. These areas were purchased by the Air Force in the 1960s. There is an easement extending in a 1,200-foot radius from each LF intended to preclude the presence of inhabited buildings and to limit the use of the land to agricultural and grazing.

The buried HICS network between the LFs and MAFs is at least 24 inches below the surface with junction boxes and manhole access at or near the surface level. The cable corridor has a 16.5-foot easement that allows the Air Force to maintain, repair, and operate the cable. Cultivation and harvesting of crops is permitted within this easement.

Each LF is within a fenced site surrounded by a 25-foot-wide zone that is kept free of vegetation. Farmers may not plant crops within this zone. A gravel access road is located outside of the fenced area.

Each MAF contains single-story support buildings and paved areas within a fenced compound; features outside the fenced area include a paved access road, an asphalt-paved helicopter-landing pad, and a sewage lagoon.

3.2.1.2 Aesthetics.

Visual sensitivity is characterized in terms of high, medium, and low levels. High visual sensitivity exists in areas where views are rare, unique, or in other ways special, such as in a remote pristine environment. Medium visual sensitivity is characteristic of areas where human influence and modern civilization are evident, and the presence of motorized vehicles is commonplace. Low visual sensitivity areas tend to have minimal landscape features with little change in form, line, color, and texture.

Most of the structures at an LF are level with or close to the ground. Close-up views of an LF include the ground-level concrete launch tube cover, vent pipes, and gravel areas. The most visible features at an LF are the chain link security fencing, a single white pole (electronic surveillance system) approximately 15 feet tall, and an adjacent electrical power pole. Because the MAFs contain buildings, they are more readily visible from a greater distance than the LFs. Views of MAFs consist of one or more single-story buildings, a sewage lagoon, ASTs, an access road, and paved areas. Taller structures, including antennae, electrical power poles, and security lighting poles, are also present.

The landscape in which the LFs and MAFs are situated is generally rural. Much of the area contains views of wide-open cropland and grassland areas on rolling hills, or of buttes and mountains. Many MAFs are situated in open, treeless areas and are visible at a distance from public roads. The appearance of the MAFs in the generally wide-open landscape is not too different from the views of the widely scattered farm and ranch buildings in the surrounding landscape. LFs are not highly visible at a distance and are not significant features in views of the local area. Therefore, because of the open views with farm/ranch structures, the former 564 MS area can be considered to have a medium visual sensitivity.

3.2.2 F.E. Warren AFB

The ROI for land use is the area of and immediately adjacent to each of the LFs and MAFs within the former 400 MS area. The ROI for aesthetics is the area containing views of these facilities.

3.2.2.1 Land Use.

Land within the former 400 MS area is generally rural. This area is also sparsely populated, and most communities are small with exceptions such as the City of Cheyenne, and the towns of Torrington, Wheatland, and Chugwater. However, no LFs or MAFs are situated within or adjacent to communities. Similar to those associated with the former 564 MS at Malmstrom AFB, Montana, LFs and MAFs of the former 400 MS are situated in undeveloped areas that consist of cropland, grazed rangeland, or grassland.

There are 50 LFs and five MAFs within the former 400 MS area, all with "top-side" configurations and buried HICS networks similar to those associated with Malmstrom AFB (former 564 MS).

Each MAF also contains single-story support buildings and paved areas within a fenced compound; features outside the fenced area include a paved access road, an asphalt-paved helicopter-landing pad, and a sewage lagoon.

3.2.2.2 Aesthetics.

As discussed in Section 3.2.1.2, most of the structures at an LF are level with or close to the ground. Close-up views of an LF include the ground-level concrete launch tube cover, vent pipes, and gravel areas. The most visible features at an LF are the chain link security fencing, a single white pole (electronic surveillance system) approximately 15 feet tall, and an adjacent electrical power pole. Because the MAFs contain buildings, they are more readily visible from a greater distance than the LFs. Views of MAFs consist of one or more single-story buildings, a sewage lagoon, ASTs, an access road, and paved areas. Taller structures, including antennae, electrical power poles, and security lighting poles, are also present.

The landscape in which the LFs and MAFs are situated is generally rural. Much of the area contains views of wide-open cropland and grassland areas on rolling hills, or of buttes and mountains. Many MAFs are situated in open, treeless areas and are visible at a distance from public roads. The appearance of the MAFs in the generally wide-open landscape is not too different from the views of the widely scattered farm and ranch buildings in the surrounding landscape. LFs are not highly visible at a distance and are not significant features in views of the local area. Therefore, because of the open views with farm/ranch structures, the former 400 MS area can be considered to have a medium visual sensitivity.

3.2.3 Vandenberg AFB

The ROI for land use is the areas of and immediately adjacent to each of the LFs. The ROI for aesthetics is the area containing views of these facilities.

3.2.3.1 Land Use.

Land in the vicinity of the LFs at Vandenberg AFB is vacant and undeveloped and in close proximity to other LFs and the Pacific Ocean. The four LFs are

located within the boundaries of and in the remote northern portion of Vandenberg AFB.

Each LF is approximately 1 acre in area, and consists of "top-side" facilities similar to those described for the former 564 and 400 MS LFs. However, the surface at each LF at Vandenberg AFB is paved with asphalt. Additional differences to those of the former 564 and 564 MS include the presence of light poles; a 30-foot antenna; a retractable, aboveground launch tube environmental enclosure, at LF-06; and a 4,000 square foot corrugated support/storage building at LF-25.

3.2.3.2 Aesthetics.

Most of the structures at the LFs at Vandenberg AFB are also level with or close to the ground. Close-up views of an LF include the ground-level concrete launch cover, vent pipes, and asphalt-paved areas. The most visible features are similar to those of the former 564 and 400 MS, with the exception of the antennas, light poles, and support structures (i.e., the movable silo shelter at LF-06 and the storage building at LF-25).

The landscape in which the LFs at Vandenberg AFB are situated is generally vacant and undeveloped coastal hillsides. Due to its proximity to the Pacific Ocean, the area in the vicinity of the LFs can be considered to have a high visual sensitivity.

3.3 HAZARDOUS MATERIALS AND HAZARDOUS WASTE MANAGEMENT

3.3.1 Malmstrom AFB

Hazardous materials and hazardous waste management activities at Malmstrom AFB are governed by specific environmental regulations. For the purpose of this analysis, the term hazardous material or hazardous waste will mean those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9601, et seq., as amended, and the Solid Waste Disposal Act, as amended by RCRA, 42 U.S.C. Sections 6901-6992, as amended. In general, these include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health, welfare, or the environment when released into the environment. The state regulations, which are at least as stringent as the federal regulations, are found in Administrative Rules of Montana (ARM) Title 17, Chapter 53.

The ROI for hazardous materials and hazardous waste, including non-regulated waste such as used motor oil, encompasses those areas that could potentially be exposed to a release during dismantlement activities.

3.3.1.1 Hazardous Materials Management.

Hazardous materials usage at the LFs and the MAFs are managed in accordance with Air Force Occupational Safety and Health (AFOSH) Standard 161-21, Hazard Communication, Air Force Instruction (AFI) 32-7086, Hazardous Materials Management, and Federal Standard 313D. The hazardous materials associated with the sites were those utilized during the operation and maintenance of emergency electrical generator and heating, ventilation, and air conditioning (HVAC) systems, and facility maintenance. Hazardous materials that were utilized at LF and MAF facilities when they were active included petroleum, oils, and lubricants (POL); fuels, batteries, and ethylene glycol that were used for the diesel generators; sodium chromate that was utilized in facility chiller units and to cool the missile guidance sets; lead-acid batteries used as a start-up power source for emergency back-up generators; and refrigerant that was utilized in facility HVAC systems. However, in 2007, these materials were removed from the LFs and MAFs as part of the 564 MS deactivation activities. Hazardous materials are not currently used at LF or MAF locations.

3.3.1.2 Hazardous Waste Management.

Hazardous wastes generated at Malmstrom AFB, including the LFs and the MAFs, are regulated by RCRA (Title 40 CFR 260-280), and the U.S. EPA has authorized the State of Montana to enforce RCRA regulations in the state as set forth in ARM Title 17, Chapter 53. These regulations require that hazardous waste be handled, stored, transported, disposed, or recycled according to defined procedures.

Additionally, hazardous wastes, including non-regulated waste such as motor oil, generated at the LFs and the MAFs, are managed in accordance with the Malmstrom AFB Hazardous Waste Management Plan (OPLAN 32-7042). Guidance in the Malmstrom AFB Hazardous Waste Management Plan is derived from AFI 32-7042, Solid and Hazardous Waste Compliance, which provides a framework for complying with environmental standards applicable to the proper management of hazardous waste. The Malmstrom AFB Hazardous Waste Management Plan implements the above regulations and outlines the procedures for disposing of hazardous waste. Implementing the procedures outlined in OPLAN 32-7042 ensures the proper identification, management, and disposition of hazardous waste, and compliance with applicable federal, state, and DOD requirements. Finally, the base maintains a Hazardous Materials Emergency Response Plan (HMERP) (OPLAN 32-4) and Storm Water Pollution Prevention Plan (SWPPP) (OPLAN 32-7041) that establishes responsibilities and contingency plans in the event of a hazardous substance release and identifies the measures for preventing a release of a hazardous substance, respectively.

Because the 564 MS was deactivated in 2007, hazardous wastes are not currently generated at the LFs or MAFs.

3.3.1.3 Environmental Restoration Program Sites.

The ROI for ERP sites encompasses those areas at the LFs and MAFs that have been characterized with potential contaminant concentrations.

The ERP was established to identify, characterize, and remediate CERCLA related contamination on Air Force installations. The program is designed to evaluate past disposal sites, control the migration of contaminants, and control potential hazards to human health and the environment. The ERP has been established as the mechanism for the CERCLA (42 U.S.C. Section 9601) process, incorporating applicable RCRA and state regulations, as well as meeting requirements of the National Oil and Hazardous Substance Pollution Contingency Plan (40 CFR Part 300). To ensure compliance with CERCLA regulations, the ERP was implemented to identify potentially contaminated sites, investigate those sites, and evaluate and select remedial actions.

Five ERP sites are associated with the former 564 MS. ERP/Release Site 1331 at LF Q-15 and ERP/Release Site 3434 at LF Q-18 both involved diesel fuel surface spills and have been closed (Montana Department of Environmental Quality, 2010a, 2010b).

ERP/Release Site 2662, located at MAF P-0, is associated with petroleum-related soil contamination identified during UST removal activities in 1995. During the UST removal, approximately 400 CY of petroleum-contaminated soil was also excavated and landfarmed to the east of the excavation. In addition, approximately 500 gallons of petroleum-contaminated water was pumped from the excavation. No contaminated soil was found along the conveyance piping. A remedial investigation (RI) was completed in 1996 to further assess soil contamination. Thirty soil borings were advanced in the vicinity of the former UST. Soil samples were collected and analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX), gasoline range organics (GRO), and diesel range organics (DRO). One of the thirty soil samples analyzed exceeded regulatory thresholds for gasoline. Based on the results of the RI, it was recommended that the site be closed due to the limited extent of soil contamination, the limited migration potential, and the lack of potential receptors. It was also recommended that natural attenuation be utilized as the mitigation method. The Montana Department of Environmental Quality (DEQ) does not have guidance to allow for risk-based closure of sites of this nature. Additional site investigation has been proposed to confirm natural attenuation has been an effective remedial solution and to confirm a lack of groundwater impacts. ERP/Release Site 2662 remains active, with an anticipated site close-out date of 2016 (Malmstrom AFB, 2008a).

ERP/Release Sites 1089 and 2137, located at MAF S-0, are associated with petroleum-related soil and shallow/perched groundwater contamination identified during UST removal activities in 1991 and 1994. During UST removals, a total of approximately 90 CY of petroleum-contaminated soil was also excavated and landfarmed on site. Initial site investigation activities were conducted in 1992, and consisted of soil, soil gas, and groundwater sampling and analysis. Based

on the results of the initial investigation, it was concluded that the USTs had not impacted the deep aquifer. A full RI was completed in 1995 to determine the lateral and vertical extent of contamination. It was concluded that petroleum-related contamination was limited to the UST excavation and that groundwater contamination was limited to a 2,500 square foot area located to the southeast (downgradient) of the former USTs. In 1996, a human health and ecological risk assessment was conducted and submitted to Montana DEQ for concurrence. Although the risk assessment determined that no unacceptable risks were found for on-site workers or off-site residents, Montana DEQ recommended long term monitoring and a bioremediation pilot study using an oxygen release compound (ORC). ORC was installed via groundwater monitoring wells in 1997, and the site was monitored until 2000. In 2003, a follow-up investigation and remedial excavation was conducted. Based on confirmation soil sampling results following excavation, the remedial action had succeeded in reducing the subsurface soil contamination. Site closure was recommended. However, ERP/Release Sites 1089 and 2137 remain active, with an anticipated site close-out date of 2018 (Malmstrom AFB, 2008b).

3.3.1.4 Asbestos.

The ROI for asbestos encompasses those areas at the LFs and MAFs that have the possibility for exposure to asbestos.

ACM and ACM abatement are regulated by the U.S. EPA and the Occupational Safety and Health Administration (OSHA). Release of asbestos fiber emissions into the ambient air is regulated in accordance with Section 112 of the Clean Air Act (CAA), which established the National Emissions Standards for Hazardous Air Pollutants (NESHAP). Under NESHAP, the owner of a structure must, prior to demolition or renovation of buildings with ACM, provide notice to the regulator with CAA authority (i.e., either the U.S. EPA or its state counterpart). The NESHAP regulations (40 CFR Part 61, Subpart M) address the demolition or renovation of buildings with ACM. The Asbestos Hazard Emergency Response Act (AHERA), P.L. 99-519 and P.L. 101-637, addresses worker protection for employees who work around or remediate ACM. The state of Montana also manages asbestos under ARM Title 17, Chapter 74, and the Clean Air Act of Montana, Montana Code Annotated (MCA) Title 75, Chapter 2, Part 5.

Renovation or demolition of buildings with ACM can release asbestos fibers into the air. Therefore, the current Air Force practice is to manage or abate ACM in active facilities, and abate ACM per regulatory requirements prior to facility demolition. Abatement of ACM occurs when there is a potential for asbestos fiber releases that would affect the environment or human health.

Malmstrom AFB currently samples project areas prior to initiating any renovation or demolition of structures to verify the presence or absence of ACM. This process allows the Air Force to confidently disclose to workers the type, condition, and estimated amount of ACM that could be present so that appropriate safety measures can be implemented to protect workers potentially exposed.

Results of ACM sampling conducted at each LF and MAF in 2006 indicated that the types of ACM, and areas that ACM were found, are similar for all facilities. For the LFs, ACM was typically identified in gaskets, piping, and elbows of back-up generators at the facilities, as well as in some floor tile. For the MAFs, ACM was typically identified in pipe elbows and fittings within the domestic water pump house and the boiler room of the facilities (Malmstrom AFB, 2006g).

3.3.1.5 Lead-Based Paint.

The ROI for LBP encompasses those areas at the LFs and MAFs that have the possibility for exposure to LBP.

Lead is a heavy ductile metal commonly found in association with organic compounds, as well as in oxides, salts, or as metallic lead. Human exposure to lead has been determined to be an adverse health risk by agencies such as OSHA and the U.S. EPA. Sources of exposure to lead are through paint, dust, and soil. In 1973, the Consumer Product Safety Commission (CPSC) established a maximum lead content in paint of 0.5 percent by weight in a dry film of newly applied paint. In 1978, the Consumer Product Safety Act (P.L. 101-608 as implemented by 16 CFR Part 1303) lowered the allowable lead level in paint to 0.06 percent by weight in a dry film of newly applied paint. Hazardous waste containing lead is disposed in accordance with 40 CFR Part 260, et seq., and 29 CFR Part 1910.120. Additionally, DOD implemented a ban of LBP use in 1978; therefore, it is possible that facilities constructed prior to or during 1978 may contain LBP. The Air Force does not actively pursue removal of LBP. Instead, it is managed in place or removed by the Air Force, as necessary.

Malmstrom AFB currently samples project areas prior to initiating any renovation or demolition of structures to verify the presence or absence of LBP. This process allows the Air Force to confidently disclose to workers the type, condition, and estimated amount of LBP that could be present so that appropriate safety measures can be implemented to protect workers potentially exposed.

A comprehensive LBP survey of the LFs and the MAFs has not been conducted; however, because the facilities were constructed prior to 1978, LBP is likely to be present.

3.3.1.6 Polychlorinated Biphenyls.

The ROI for PCBs encompasses those areas at the LFs and MAFs that have the possibility for exposure to PCBs.

The disposal of PCBs is regulated under the federal Toxic Substances Control Act (TSCA) (15 U.S.C. Section 2601, et seq., as implemented by 40 CFR Part 761), which banned the manufacture and distribution of PCBs, with the exception of PCBs used in enclosed systems. By federal definition, PCB equipment contains 500 parts per million (ppm) PCBs or more, whereas PCB-contaminated equipment contains PCB concentrations equal to or greater than 50 ppm, but less than 500 ppm. TSCA regulates, and the U.S. EPA enforces, the removal

and disposal of sources of PCBs containing 50 ppm or more; the regulations are more stringent for PCB equipment than for PCB-contaminated equipment.

Equipment containing PCBs has been removed from the LFs and MAFs. A weather sealing coating may be present on the exterior concrete of the LFSBs that contains solid PCB material. The USTs at the LF sites contained a coating that included a similar PCB material. The solid PCB coating on the USTs at the LF sites was sampled and analyzed, with results reported below laboratory reporting limits. Toxicity characteristic leaching procedure (TCLP) analysis indicated that the PCB material was not leachable (Toltest, 2007). Because the USTs were installed at the same time that the LFSBs were constructed, the coating used on the USTs is likely the same coating used on the exterior of the buried LFSB; therefore, the PCB concentration of the coating are also likely to be below reporting limits. Sampling of the coating on the LFSB had not been conducted. A 5-year groundwater monitoring effort that focused on potential PCB contamination has been conducted at dismantled LFs associated with Whiteman AFB, which contained solid PCB coatings. PCBs were not detected above laboratory reporting limits in any of the groundwater samples analyzed for the constituent, which further confirms that the solid PCB material is not leachable (U.S. Geological Survey, 2002).

Transformers at the LFs and the MAFs are situated outside the security fencing and are not Air Force property. The utility purveyor is responsible for any PCBs associated with these transformers; the PCB status of these transformers is not known.

3.3.1.7 Ordnance.

The ROI for ordnance is focused on the LF locations where ordnance items were once present and maintained.

Missile components, including the reentry vehicle (RV), propulsion system rocket engine (PSRE), booster, and launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs were removed from the LFs and MAFs in 2007 during deactivation activities.

3.3.2 F.E. Warren AFB

Hazardous materials and hazardous waste management activities at F.E. Warren AFB are governed by the same specific federal environmental regulations as those at Malmstrom AFB. Specific state regulations (if applicable) are discussed in appropriate sections below.

The ROI for hazardous materials and hazardous waste, including non-regulated waste such as used motor oil, encompasses those areas that could potentially be exposed to a release during dismantlement activities.

3.3.2.1 Hazardous Materials Management.

Hazardous materials that were utilized at LF and MAF facilities when they were active included POL; fuels, batteries, and ethylene glycol that were used for the diesel generators; Freon (R-22) that was utilized in facility chiller units and to cool missile guidance sets; lead-acid batteries used as the start-up power source for emergency back-up generators; and refrigerant that was utilized in facility HVAC systems. However, in 2005 these materials were removed from the LFs and MAFs as part of the 400 MS deactivation activities. Hazardous materials are not currently used at LF or MAF locations.

3.3.2.2 Hazardous Waste Management.

Hazardous wastes generated at F.E. Warren AFB, including the LFs and the MAFs, are regulated by RCRA (Title 40 CFR 260-280). The U.S. EPA has authorized the State of Wyoming to enforce RCRA regulations in the state as set forth in Wyoming Hazardous Waste Management Statutes (Wyoming Statute [W.S.] 35-11-103 d vii). These regulations require that hazardous waste be handled, stored, transported, disposed, or recycled according to defined procedures.

Additionally, hazardous wastes (including non-regulated waste such as motor oil) generated are also managed in accordance with the F.E. Warren AFB Hazardous Waste Management Plan. Wastes are stored on base at specific locations designated to manage wastes appropriately. Hazardous wastes are generally stored either at the hazardous waste 90-day accumulation site (Building 944) or at one of twenty hazardous waste satellite accumulation points. At the satellite accumulation points, the volume of hazardous waste collected cannot exceed 55 gallons and the holding time cannot exceed 365 days. At the 90-day accumulation site, hazardous wastes may be stored in volumes up to the maximum design capacity of the site, for no more than 90 days, then the wastes must be transported from the base (F.E. Warren AFB, 2000).

Due to the deactivation of the 400 MS, hazardous wastes are not generated at the LFs or MAFs.

3.3.2.3 Environmental Restoration Program Sites.

No ERP sites are associated with LFs and MAFs within the former 400 MS.

3.3.2.4 Asbestos.

The ROI for asbestos encompasses those areas at the LFs and MAFs that have the possibility for exposure to asbestos.

ACM and ACM abatement are regulated by the same federal environmental regulations as those at Malmstrom AFB. The state of Wyoming also manages asbestos under Section 29 of the Wyoming Air Quality Standards and Regulations with enforcement by the Wyoming DEQ Air Quality Division.

F.E. Warren AFB currently samples project areas prior to initiating any renovation or demolition of structures to verify the presence or absence of ACM. This process allows the Air Force to confidently disclose to workers the type, condition, and estimated amount of ACM that could be present so that appropriate safety measures can be implemented to protect workers potentially exposed.

Facilities at the LFs have been surveyed and are asbestos-free. Previous renovation activities at the MAFs have removed asbestos with the exception of ACM in the ceiling ductwork and in the insulation around some pipes above the false ceiling of the LCSB. There is no ACM in the air ducts of the MAFs. ACM remaining at the MAFs include transite siding on the walls of each MAF garage furnace room (F.E. Warren AFB, 2000).

3.3.2.5 Lead-Based Paint.

The ROI for LBP encompasses those areas at the LFs and MAFs that have the possibility for exposure to LBP.

As stated previously, the Air Force does not actively pursue removal of LBP. Instead, it is managed in place or removed by the Air Force, as necessary.

F.E. Warren AFB currently samples project areas prior to initiating any renovation or demolition of structures to verify the presence or absence of LBP. This process allows the Air Force to confidently disclose to workers the type, condition, and estimated amount of LBP that could be present so that appropriate safety measures can be implemented to protect workers potentially exposed.

A comprehensive LBP survey of the LFs and the MAFs has not been conducted; however, because the facilities were constructed prior to 1978, LBP is likely to be present.

3.3.2.6 Polychlorinated Biphenyls.

The ROI for PCBs encompasses those areas at the LFs and MAFs that have the possibility for exposure to PCBs.

The disposal of PCBs is regulated by the same specific federal environmental regulations as those at Malmstrom AFB.

Equipment containing PCBs has been removed from the LFs and MAFs. A weather sealing coating may be present on the exterior concrete of the LFSB that contains solid PCB material. The USTs at the LF sites contained a coating that included a similar PCB material. The solid PCB coating on the UST at the LF sites was sampled and analyzed, with results below laboratory reporting limits. TCLP analysis indicated that the PCB material was not leachable (Toltest, 2007). Because the USTs were installed at the same time that the LFSBs were constructed, the coating used on the USTs is likely the same coating used on the exterior of the buried LFSB; therefore, the PCB concentration of the coating would likely also be below reporting limits. Sampling of the coating on the LFSB has not

been conducted. A 5-year groundwater monitoring effort that focused on potential PCB contamination has been conducted at dismantled LFs associated with Whiteman AFB, which contained solid PCB coatings. PCBs were not detected above laboratory reporting limits in any of the groundwater samples analyzed for the constituent, which further confirms that the solid PCB material is not leachable (U.S. Geological Survey, 2002).

Transformers at the LFs and the MAFs are situated outside the security fencing and are not Air Force property. The utility purveyor is responsible for any PCBs associated with these transformers; the PCB status of these transformers is not known.

3.3.2.7 Ordnance.

The ROI for ordnance is focused on the LF locations where ordnance items were once present and maintained.

Missile components, including the RV, PSRE, booster, and launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs were removed from the LFs in 2005 during deactivation activities.

3.3.3 Vandenberg AFB

Hazardous materials and hazardous waste management activities at Vandenberg AFB are governed by the same specific federal environmental regulations as those at Malmstrom AFB and F.E. Warren AFB. Specific state regulations (if applicable) are discussed in appropriate sections below.

The ROI for hazardous materials and hazardous waste, including non-regulated waste such as used motor oil, encompasses those areas that could potentially be exposed to a release during dismantlement activities.

3.3.3.1 Hazardous Materials Management.

Use of hazardous materials at Vandenberg AFB conform to DOD, U.S. Air Force, and other federal hazardous materials management requirements. Hazardous materials are tracked using Environmental Management System software. These procedures are in accordance with the 30th Space Wing Hazardous Materials Management Plan.

Hazardous materials that were utilized at LF facilities when they were active included POL; fuels, batteries, and ethylene glycol that were used for the diesel generators; sodium chromate and Freon that was utilized in facility chiller units and to cool missile guidance sets; lead-acid batteries used as the start-up power source for back-up generators; and refrigerant that was utilized in facility HVAC systems. However, hazardous materials and equipment within LF-05, LF-07, and LF-25 containing liquids (i.e., fuels, oil, hydraulic fluid, sodium chromate, etc.) have been drained and removed. The hazardous materials and fluids in

equipment within LF-06 will be drained and removed by the Air Force prior to dismantlement.

3.3.3.2 Hazardous Waste Management.

Hazardous wastes generated at Vandenberg AFB, including the LFs, are regulated by RCRA (Title 40 CFR 260-280). The California EPA Department of Toxic Substances Control (DTSC) also regulates hazardous wastes under the California Health and Safety Code, Sections 25100 through 67188. These regulations require that wastes be handled, stored, transported, disposed, or recycled according to defined procedures. The Vandenberg AFB Hazardous Waste Management Plan outlines the procedures to be followed for hazardous waste disposal. The Vandenberg AFB HMERP establishes responsibilities, outlines personnel duties, and provides resources and guidelines for use in the control, clean-up, and emergency response for spills/releases. Hazardous wastes generated during Vandenberg AFB activities are initially collected at the point of generation and, if not reused or recycled, transported to the consolidated Collection Accumulation Point managed by the base Environmental Office, Compliance Section. Here it is containerized and segregated by type. Following initial containerization, waste must be removed from the consolidated Collection Accumulation Point within 90 days, at which time the hazardous waste must be transported to a permitted off-site Treatment, Storage, and Disposal Facility. Due to the deactivation of the LFs, hazardous wastes are no longer generated at LF-05, LF-06, LF-07, and LF-25.

3.3.3.3 Environmental Restoration Program Sites.

The ROI for ERP sites encompasses those areas at the LFs that have been characterized with potential contaminant concentrations. Each of the LFs at Vandenberg AFB has been identified as an Area of Concern (AOC) site.

AOC-175, located at LF-05, is associated with various “wash-down” activities at the launch facility. Following each missile launch at LF-05, the silo was washed down. Until 1991, the resulting wash-water was discharged to grade in the surrounding area. After 1991, wash-water was containerized in a sump, discharged to 55-gallon drums, and transported to the Defense Reutilization and Marketing Office (DRMO). In 2005, seven borings were advanced to depths of up to 50 feet below ground surface (bgs) in the vicinity of LF-05 to assess potential impacts from the discharge activities. Soil samples were collected and analyzed for total petroleum hydrocarbons as gasoline (TPH-g), total petroleum hydrocarbons as diesel and oil (TPH-d/o), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), Title 22 metals, monomethyl hydrazine, and perchlorate. The results of the investigation identified no significant impacts from solvents, rocket fuel, or petroleum fuel-related compounds. In addition, perchlorate was not detected in any of the soil samples. The elevated levels of metals detected during the investigation were concluded to be a result of the presence of fill material or to be naturally occurring. No other contaminants of concern were detected. However, due to the elevated levels of metals and VOCs detected at LF-05, a human health risk screening assessment was conducted. It was concluded that no evidence of significant contamination

had been identified at AOC-175; therefore, AOC-175 was recommended for closure (Vandenberg AFB, 2006). AOC-175 has subsequently been closed.

AOC-180, located at LF-06, is associated with post-missile launch wash-down activities and discharging the resulting wash-water to grade. In 2006, seven soil borings were advanced to depths up to 40 feet bgs to assess potential impacts from such activities. Soil vapor and groundwater samples were also collected. Soil samples were analyzed for TPH-g, TPH-d/o, polycyclic aromatic hydrocarbons (PAHs), PCBs, dioxins/furans, perchlorate, hexavalent chromium, and Title 22 metals. Soil vapor samples were analyzed for VOCs. Groundwater samples were analyzed for VOCs, 1,4-dioxin, TPH-g, TPH-d/o, PAHs, dioxins/furans, hydrazine, perchlorate, hexavalent chromium, and Title 22 metals. Benzene was detected in soil vapor samples at concentrations above residential screening levels. TPH-d/o was detected in surface soil samples at concentrations above regulatory action levels and benzene, carbon tetrachloride and chloroform were detected in groundwater at concentrations above regulatory action levels. In 2009, seven additional borings were advanced and converted to temporary and/or permanent groundwater monitoring wells to delineate the extent of ground water contamination in the vicinity of LF-06. It was concluded that the benzene plume in the vicinity of LF-06 measures approximately 480 feet long by 320 feet wide, the carbon tetrachloride plume measures approximately 250 feet long by 175 feet wide, and the chloroform plume measures approximately 280 feet long by 360 feet wide (Vandenberg AFB, 2010a). Based on soil sampling and analysis, the Air Force recommended a no further action determination to the Regional Water Quality Control Board (RWQCB) for TPH-impacted soil. The Air Force also recommended that Institutional Controls (ICs) be imposed on the AOC to ensure no drinking water supply wells are installed at LF-06. AOC-180 remains active.

AOC-181, located at LF-07, is associated with post-missile launch wash-down activities and discharging the resulting wash-water to grade. In 2006, six soil borings were advanced to depths up to 75 feet bgs to assess potential impacts from such activities. Soil vapor and groundwater samples were also collected. Soil, soil vapor, and groundwater samples were analyzed for the constituents listed for AOC-180. Benzene was detected in soil vapor samples at concentrations above residential screening levels. TPH-d/o was also detected in surface soil samples at concentrations above regulatory action levels and carbon tetrachloride was detected in groundwater at concentrations above regulatory action levels. In 2009, twenty-one additional borings were advanced and converted to soil vapor probes and temporary groundwater monitoring wells to delineate the extent of ground water contamination in the vicinity of LF-07. It was concluded that the TPH-impacted soil appeared to be limited to the footprint of the launch facility. Therefore, the Air Force recommended a no further action determination to the RWQCB for TPH-impacted soil. VOCs in soil gas had been delineated and were concluded to not pose a risk to occupants at LF-07. The Air Force recommended that VOC contamination in soil gas and groundwater be left in place and monitored. The Air Force also recommended that ICs be imposed on the AOC to ensure no drinking water supply wells are installed at LF-07 (Vandenberg AFB, 2010b). AOC-181 remains active.

AOC-186, located at LF-25, is associated with a former 11,000-gallon diesel UST that was abandoned in place in 1995. Based on soil and groundwater sampling conducted from 2000 to 2004, there appeared to be no non-fuel-related site impacts due to past launch operations (Vandenberg AFB, 2005). AOC-186 has subsequently been closed.

3.3.3.4 Asbestos.

The ROI for asbestos encompasses those areas at the LFs that have the possibility for exposure to asbestos.

ACM and ACM abatement are regulated by the same federal environmental regulations as those at Malmstrom AFB and F.E. Warren AFB. The State of California regulates asbestos under Title 8 California Code of Regulations (CCR), Section 1529 and 5208.

ACM sampling was conducted at LF-07 in 1993 and at the storage facility associated with LF-25, with ACM detected in the sodium chromate tank insulation at LF-07 (Vandenberg AFB, no date). However, comprehensive ACM sampling has not been conducted. Therefore, it is assumed that ACM is present at the LFs.

3.3.3.5 Lead-Based Paint.

The ROI for LBP encompasses those areas at the LFs that have the possibility for exposure to LBP.

As stated previously, the Air Force does not actively pursue removal of LBP. Instead, it is managed in place or removed by the Air Force, as necessary.

Vandenberg AFB currently samples project areas prior to initiating any renovation or demolition of structures to verify the presence or absence of LBP. This process allows the Air Force to confidently disclose to workers the type, condition, and estimated amount of LBP that could be present so that appropriate safety measures can be implemented to protect workers potentially exposed.

A comprehensive LBP survey of the LFs has not been conducted; however, because the facilities were constructed prior to 1978, LBP is likely to be present.

3.3.3.6 Polychlorinated Biphenyls.

The ROI for PCBs encompasses those areas at the LFs that have the possibility for exposure to PCBs.

The disposal of PCBs is regulated by the same specific federal environmental regulations as those at Malmstrom AFB and F.E. Warren AFB.

Equipment containing PCBs has been removed from LF-05, LF-07, and LF-25 and will be removed from LF-06 by the Air Force prior to dismantlement. The

presence of a weather sealing coating on the exterior concrete of the LFSBs that contains solid PCB material noted at Malmstrom AFB and F.E. Warren AFB LFs is not present at the Vandenberg AFB LFs.

3.3.3.7 Ordnance.

The ROI for ordnance is focused on the LF locations where ordnance items were once present and maintained.

Missile components, including PSREs, and boosters are not present as a result of missiles not being stored in the silos at Vandenberg AFB but rather being launched from the silos. Launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs have been removed from LF-05, LF-07 and LF-25. Such materials will also be removed from LF-06 by the Air Force prior to dismantlement.

3.4 SOILS AND GEOLOGY

3.4.1 Malmstrom AFB

The ROI for evaluation of potential impacts to soils and geology from proposed dismantlement activities is the area of the former 564 MS, which covers approximately 2,645 square miles in northwestern Montana with specific impacts anticipated to occur at the individual LF and MAF locations. The western edge of the 564 MS is adjacent to the eastern edge of the Rocky Mountains, with the northern Great Plains to the north, south, and east. Sedimentary rocks dominate the geologic landscape for most of the 564 MS, with particular soil types being specific to the parent material and the topography upon which it rests. The physiography plays an important role as to the type of soil developed at the sites. LF and MAF sites are found from the foothill areas of the Rocky Mountains to the rolling topography of the glaciated high plains. Soil types range from thick, well-drained soils found on terraces and foothill areas to well-drained, clay rich soils in the glaciated areas.

3.4.1.1 Soils.

Various soil types are present within the area of the former 564 MS. Soil types vary depending on what area the LFs and MAFs are situated. The primary reasons for diverse soils include the diverse geologic materials from which the soils form from, and the landforms from which the soils are formed. Throughout central Montana, the plains rise up to meet the mountains. Streams leaving the mountains deposited gravelly and cobbly outwash as broad alluvial fans and terraces. Soils on these broad plains and terraces are typical Mollisols (dark-colored, calcium-rich soil) and Argiborolls (clay rich, dark-colored soil). Alluvial surfaces emanate from the mountains with a significant component of limestone that have Calicborolls (calcium carbonate rich soil). These soils are characterized by thin, dark grayish brown calcareous clay loam. The calcium carbonate content ranges from 30 to 50 percent. Gravels, cobbles, and rock fragments are common in most soil types. The soils are typically well drained (U.S. Department of Agriculture, 1982). Due to the disturbed nature of the LF

and MAF locations, the soils on-site are considered urban land complex (primarily back fill material).

3.4.1.2 Geology.

Precambrian to Quaternary age rock units of diverse lithology and composition are exposed within the area of the former 564 MS. Precambrian limestone, dolomite, quartzite, and argillite of the Belt Supergroup and Paleozoic units consisting of quartzite, sandstone, argillite, shale, limestone, and chert are exposed as partially juxtaposed thrust slices in the Rocky Mountains along the western margin of the MS. The largest portion of the area is characterized by predominantly Cretaceous formations of horizontal to slightly inclined beds of shale, siltstone, sandstone, and coal overlying slightly warped Paleozoic rocks. These sedimentary formations have been intruded by Tertiary igneous laccoliths and volcanic rocks forming domal, circular mountain masses and small mountain chains. In addition, glacial and fluvial processes have covered extensive areas of the plains with unconsolidated deposits of gravel, sands, silts, and clay of Quaternary age.

The former 564 MS area is located almost entirely within Seismic Zone 1 (International Conference of Building Officials, 1991), with a portion of the MS closest to the Rocky Mountains within Seismic Zone 2b. While the area closest to the Rocky Mountains has the higher potential for ground shaking, the bulk of the area within the MS is fairly tectonically stable. In Seismic Zone 1, there is a one in ten chance of experiencing a ground acceleration of 1/10th the acceleration due to gravity (0.1 g) once in 50 years. In Seismic Zone 2b, there is a one in ten chance of experiencing a ground acceleration of 2/10th the acceleration due to gravity (0.2 g).

3.4.2 F.E. Warren AFB

The ROI for evaluation of potential impacts to soils and geology from proposed dismantlement activities is the area of the former 400 MS, which covers approximately 2,000 square miles in southeastern Wyoming with specific impacts anticipated to occur at the individual LF and MAF locations. The three counties in southeastern Wyoming that comprise the former 400 MS (Goshen, Platte, and Laramie) are found in two physiographic provinces. Goshen County is located entirely within the High Plains section of the Great Plains Province. Laramie and Platte Counties are within both the Great Plains and the Southern Rocky Mountains Provinces. The Southern Rocky Mountains Province extends from southern Wyoming through Colorado to northern New Mexico. The Great Plains Province extends eastward from the Front Range of the Rocky Mountains to the Central Lowlands Province along the Mississippi Valley, and from the Rio Grande on the South to the Canadian boundary on the North.

3.4.2.1 Soils.

Soils in the area of the former 400 MS are derived primarily from windblown and alluvial sandstone. A few of the soils are derived from windblown silt. Fifty-five soil series were identified within the former 400 MS, with most of these soils

having a loam or sandy loam texture near the surface. A few soils have a silt loam or gravelly loam surface. The subsoil is primarily sandy or fine sandy loam, although a gravelly or sandy layer underlies some of the soils. Over half of the 400 MS LF sites have shallow soils, with bedrock at a depth of six to 39 inches. The underlying bedrock is mainly soft sandstone, with a few instances of siltstone or shale. The soils in the former 400 MS contain a type of clay known as montmorillinite. The clay content of the soil ranges from 14-24 percent in southeastern Platte, southern Goshen, and northern Laramie counties (F.E. Warren AFB, 2000). The organic content ranges from 0.5 percent in sandy soils to 1.5 percent in silt loams and loams. The porosity (amount of air space in the soils) ranges from about 40 percent in silt loam to 60 percent in sandy soils. Due to the disturbed nature of the LF and MAF locations, the soils on-site are considered urban land complex (primarily back fill material).

3.4.2.2 Geology.

The general near-surface geology of southeast Wyoming is dominated by clastic Tertiary sediments of the Ogallala (upper Miocene), Arikaree (lower Miocene), White River (Oligocene) formations, and Lance (Cretaceous) formations (F.E. Warren AFB, 2000). The Ogallala Formation is characterized as light-colored tuffaceous claystone, sandstone, and conglomerate. The Arikaree Formation is a light-colored, soft, porous sandstone underlain by white tuffaceous claystone. The White River Formation is a white to pale-pink blocky tuffaceous claystone and lenticular arkosic conglomerate that is subdivided into three members (Conglomerate member, Brule member, and Chadron member). The Lance Formation consists of shale and sandstone, gray siltstone, and beds of coal.

Unlike the Arikaree, the Ogallala formation is composed of highly variable, largely fluviatile deposits, including conglomerates, sandstones, and beds of silts and clay. The former 400 MS is located along the north and northwest flanks of the Denver-Julesburg Basin, a shallow regional structure in northeastern Colorado, southeastern Wyoming, and western Nebraska. Portions of this basin have been uplifted along the Horse Creek and Greyrocks Anticlines. This uplift produced minor fracturing, especially in shale. The Laramie Range in the western part of Laramie County contains pre-Tertiary rocks, the oldest being a 45-foot thick band of limestone within the Casper Formation of Late Mississippian age. Platte County also includes sections of the Laramie Mountain range, including some Paleozoic rock. The Goshen Hole Lowlands, centralized in Goshen County but spreading to include sections of Platte and Laramie County, is the wedge-shaped widening of the North Platte River. Soft layers of sedimentary rock in the Brule-Arikaree Formation were eroded down to the harder Lance Formation, after which the Hole proceeded to widen and spread, causing the surrounding escarpments to retreat. The Wheatland Flats, an area of terraces comprised of sand, gravel, cobbles, and boulders with a few lenses of clay and silt, exists in the central part of Platte County with the Arikaree and White River Formations underlying the terraces (F.E. Warren AFB, 2000).

The former 400 MS is in a zone rated low for seismicity, with only slight damage anticipated if an earthquake occurred. However, Federal Emergency Management Agency (FEMA) and the U.S. Geological Survey (USGS) have classified all of Wyoming as having a very high seismic hazard. Earthquakes of 6.2 or less on the Richter Scale (IX or less on the Modified Mercalli Scale) could occur in any part of the state. Five earthquakes of 2.5 or greater magnitude with an epicenter in Platte, Goshen, and Laramie Counties (two each in Goshen and Laramie Counties and one in Platte County) have occurred since 1871. None of these have occurred since 1986. About 40 earthquakes with an epicenter within a radius of 100 miles of the former 400 MS area have occurred since 1871 with magnitudes generally between 3.0 to 5.5. Several faults are situated throughout the former 400 MS. The Whalen Fault System and the Wheaten Fault System extend from central Platte County to northern Goshen County. Three unnamed faults occur in northern Laramie County (F.E. Warren AFB, 2000).

3.4.3 Vandenberg AFB

The ROI for evaluation of potential impacts to soils and geology from proposed dismantlement activities at Vandenberg AFB includes the northern portion of the base where the LFs are situated. Vandenberg AFB lies within a region of geologic significance characterized as the western-most land termination of the Santa Ynez Mountains. Vandenberg AFB is a complex area that includes the transition zone between the Southern Coast Range and Western Transverse Range Geomorphic Provinces of California.

3.4.3.1 Soils.

Soils at Vandenberg AFB are primarily made up of sand deposits that are generally shallow with thickness ranging between 0 and 3 feet. Erosion hazards are slight to high depending on slope and vegetative cover, with steeper slopes exhibiting a higher potential for erosion. Developed slopes are often strategically stabilized to prevent erosion (Missile Defense Agency, 2007).

Dominant soil types on Vandenberg AFB near the LFs include Botella Loam, Salinas Silty Clay Loam, Aguedo Silty Clay loam, Tierra Sandy loam, and Tierra loam. Excavations for constructing the silos disturbed an area of up to 100 feet from the LFs to a depth of about 90 feet. Fill material for these excavations consists of unconsolidated soil, sand, and rock fragments. Due to the disturbed nature of the LF locations, the soils on-site are considered urban land complex (primarily back fill material).

Based on Dibblee geologic maps of the Vandenberg AFB area, LF-5, LF-6, and LF-7 are within an area classified as (Qa) Holocene age valley and floodplain alluvial deposits; LF-25 is within an area classified as (Qoa) Pleistocene age remnants of weakly consolidated stream terrace and alluvial fan deposits of silt, sand, and gravel (Dibblee, 1989a, 1989b).

3.4.3.2 Geology.

North Vandenberg AFB is situated within the northwest-southeast trending Casmalia Hills, which are underlain by unconsolidated sedimentary rocks. Steep rounded northwest-southeast trending slopes visually characterize the area and drain northeast into the Santa Maria Valley and southwest into the Pacific Ocean. Elevation varies within the Casmalia Hills from sea level along the coast to 1,650 feet at Mount Lospe near the base's northern boundary. Vandenberg AFB is a geologically complex area that includes the transition zone between the southern Coast Range and western Transverse Ranges geomorphic provinces of California. The southern Coast Ranges, located north of the Santa Ynez River, comprise northwest-southeast trending faults and folds that appear as elongated valleys and ranges on the surface. The western Transverse Ranges are located south of the Santa Ynez River and comprise east-west trending valleys and ranges. The Santa Maria Basin occupies the space between the southern Coast Range and the western Transverse Range. Major geomorphic features of the Santa Maria Basin on Vandenberg AFB include the Casmalia and Purisima Hills, San Antonio Terrace, Barka Slough, Lompoc Valley, Burton Mesa, beaches, rocky headlands, and points. According to geologic sources, the LFs are underlain by alluvium, Holocene sand and alluvial deposits, Pleistocene-age marine and marine terrace deposits, and Middle Miocene-age marine and Mesozoic-age ultrabasic intrusive rocks (California Division of Mines and Geology, 1959).

Numerous onshore and offshore faults have been mapped within the vicinity of Vandenberg AFB; most are inactive and not capable of surface fault rupture or of generating earthquakes (Missile Defense Agency, 2007). Four potentially active faults have been mapped on Vandenberg AFB, and include the Lion's Head, Hosgri, Santa Ynez River, and Honda. The Lion's Head Fault runs through North Vandenberg AFB and is the only fault within the vicinity of the LFs (Missile Defense Agency, 2007). LF-5 is the closest silo situated approximately 750 feet south of the Lion's Head Fault. LFs 6, 7, and 25 are situated north of the fault, approximately 2,250 feet, 4,200 feet, and 3,200 feet in distance respectively (Dibblee, 1989a, 1989b).

A seismic hazard assessment was prepared for California in 1996 that identified the Lion's Head Fault as having the potential to generate an earthquake with a maximum magnitude of 6.6 on the Richter scale. The seismic hazard map presented in the report shows that the Vandenberg AFB area has a probabilistic seismic hazard for peak horizontal ground acceleration of 20-30 percent in 50 years, this compares to the area of California affected by the San Andreas Fault, which has a greater than 70 percent probabilistic seismic hazard (California Department of Conservation, 1996).

Vandenberg AFB is located in Seismic Zone IV, as defined by the Uniform Building Code (International Conference of Building Officials, 1991), characterized by areas likely to sustain major damage from earthquakes, and corresponds to intensities of VIII or higher on the Modified Mercalli Scale.

3.5 WATER RESOURCES

3.5.1 Malmstrom AFB

Although the former 564 MS covers a very large area, the ROI adopted for the water resources evaluation focuses on much smaller areas associated with the specific LFs and MAFs. For evaluation purposes the ROI is considered to be the area within the perimeter fencing at each LF and MAF. At the MAF this includes both the fenced area surrounding the sewage lagoon and the security fencing around the support facility structures.

The general setting of the MS is on the western edge of the northern portion of the Great Plains physiographic province, with transitional aspects to the adjacent Rocky Mountains physiographic province. The former 564 MS is also located within the upper portion of the Missouri River watershed, with the river flowing northeast out of the Rocky Mountains and through the City of Great Falls. The Marias River, a major tributary of the Missouri River, drains portions of the 564 MS.

Water resource regulations of concern at the federal and state level focus on protecting water quality. The principal federal laws protecting water quality are the Clean Water Act (CWA), as amended (33 U.S.C. Section 1251 et seq.) and the Safe Drinking Water Act (42 U.S.C. Section 300f et seq.). The U.S. EPA enforces both laws. The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States. In addition, the CWA protects wetlands and other aquatic habitats through a permitting process that ensures development and other activities are conducted in an environmentally sound manner. The Safe Drinking Water Act is directed at protection of drinking water supplies.

Comparable laws in Montana are covered in the Montana Water Quality Act (as codified in the MCA Title 75, Chapter 5, and with regulatory authority provided by ARM Title 17, Chapter 30), and the Public Water Supply Act (MCA Title 75, Chapter 6 with regulatory authority in ARM Title 17, Chapter 38).

3.5.1.1 Surface Water Runoff.

The regional climate of the former 564 MS area is semiarid, as it receives less than 20 inches of precipitation annually, and the majority of that occurs from April to September. This results in a relatively sparse distribution of perennial streams, and many of those have headwaters in the mountains where precipitation is greater and water is also released from snowmelt. Direct runoff in the area often occurs as the result of thunderstorms, so small watersheds can receive heavy rainfall for short durations, and localized flooding can occur. However, because of the nature of the physiographic setting (broadly sloping to flat topography with generally low relief) and the requirements of siting these facilities (open upland areas), they are mostly located away from perennial streams or waterways, and even small, non-perennial drainage courses. The LFs and MAFs are not situated within a FEMA designated 100-year flood plain and no surface water bodies are situated within the LF or MAF boundaries.

3.5.1.2 Groundwater.

Regional hydrogeology of the Northern Great Plains aquifer system is varied and contains numerous aquifers. The location of the former 564 MS, along the western transition of the Great Plains into the Rocky Mountains, further complicates this hydrogeology through uplift, folding, and faulting. Local aquifers can be found in unconsolidated surface materials of Quaternary age, or in sedimentary units of Tertiary, Cretaceous, or Paleozoic ages. In general, high mineral content is a problem with groundwater resources in the Northern Great Plains (Whitehead, 1996).

3.5.2 F.E. Warren AFB

The ROI for the water resources evaluation is similar to that described for Malmstrom AFB, focusing on the areas associated with the specific LFs and MAFs.

Federal water resources/quality regulations in Wyoming are similar to those discussed at Malmstrom AFB. Groundwater in Wyoming is classified as Groundwater of the State and then further classified according to waters that are known to be sources of supply or are unappropriated waters. Unappropriated waters are classified according to their suitability for potential use and are divided into seven classes: domestic use, agricultural use, use for livestock, fish and aquatic life, high total dissolved solids (TDS) (greater than 10,000 milligrams per liter [mg/L]), mineral, and excessively contaminated water. Each class of groundwater has specific cleanup standards according to Chapter VIII, Quality Standards for Wyoming Groundwater, promulgated in Wyoming Statutes, Section 35-11-302.

3.5.2.1 Surface Water Runoff.

The former 400 MS is located in portions of the North Platte River Basin and the South Platte River Basin. The North Platte River Basin covers most of southeastern Wyoming, part of western Nebraska, and a small portion of north central Colorado. The North Platte River Basin is subdivided into 14 watersheds. Three of these watersheds are within the former 400 MS: the Middle North Platte River, the Lower Laramie River, and Horse Creek. The extreme southern portion of the former 400 MS (LFs P-4 and P-5) is located in the South Platte River Basin. The South Platte River Basin includes the southeastern corner of Wyoming, northeast Colorado, and a small area of western Nebraska. The South Platte River Basin is subdivided into 18 watersheds. Two of these watersheds are located in the area of the former 400 MS: Lower Lodgepole Creek and Upper Lodgepole Creek.

The North Platte River is located just north of the former 400 MS (about two miles north of LF S-2) and is the only major river in the area. The Laramie River is located about one mile north of LF T-11. Major creeks in the deployment area are Horse, Chug Water, Lodgepole, Bear, and Richeau.

The LFs and MAFs are not situated within a FEMA designated 100-year flood plain and no surface water bodies are situated within the LF or MAF boundaries.

3.5.2.2 Groundwater.

Groundwater occurs mainly in Quaternary and Tertiary sediments in southeastern Wyoming. Quaternary aquifers primarily occur along stream channels and in a broad area along the North Platte River. These aquifers also consist of broad extensive sheets of alluvium that were deposited by a network of branching and rejoining streams. In an area known as the Wheatland Flats, northwest of Wheatland, an aquifer occurs in an area of terrace deposits (sand, gravel, cobbles, and boulders with a few lenses of clay and silt) up to 100 feet thick. This is an important local source of groundwater for domestic, livestock, and irrigation wells. The depth to the water table in this area is 20 to 40 feet. Because the upper Tertiary aquifers usually are at shallow depths, most wells completed in the aquifers are less than 600 feet deep. However, some well depths exceed 1,000 feet in southeastern Wyoming. Much of the water in the High Plains Aquifer System is unconfined, but clay beds and lenses of other fine-grained materials locally create confined conditions (F.E. Warren AFB, 2000).

Lower Tertiary aquifers are comprised of the White River Formation. Lower Tertiary aquifers are used for domestic and stock wells where the yields are sufficient. Lower Tertiary aquifers occur in northeastern Laramie County, southern Goshen County, and southwestern and south central Platte County with depth to groundwater in these areas ranging from 63 to 128 feet.

3.5.3 Vandenberg AFB

The ROI for the water resources evaluation is similar to that described for Malmstrom AFB, focusing on the areas associated with the specific LFs.

The Porter-Cologne Water Quality Control Act provides jurisdiction of water rights within the coastal zone of Vandenberg AFB to the California State Water Resources Control Board. Nine RWQCBs have been established to manage water quality throughout California. These Regional Boards have a number of functions, including determining beneficial uses of water for all bodies of water in their area, establishing and enforcing water quality standards for both surface and groundwater, and taking any and all actions needed to maintain the standards by controlling point and non-point sources of pollution. Allowable waste discharge into a body of water at Vandenberg AFB is strictly regulated via a permit process through the Central Coast RWQCB.

3.5.3.1 Surface Water Runoff.

Vandenberg AFB lies within the northern San Antonio Creek and the southern Santa Ynez River watersheds. Its location in a region of low precipitation creates only the seasonal flow of surface streams and existence of small ponds. The Santa Ynez River forms the boundary between North and South Vandenberg AFB. North Vandenberg AFB has three primary drainage systems that terminate in the ocean: Canada Tortuga Creek, San Antonio Creek, and Shuman Creek.

Watersheds are subject to on-base construction and agricultural runoff. The Santa Ynez River also receives off-base agricultural runoff, resulting in elevated dissolved solids, phosphates, and nitrates.

The LFs are not situated within a FEMA designated 100-year flood plain and no surface water bodies are situated within the LF boundaries.

3.5.3.2 Groundwater.

Most groundwater on Vandenberg AFB occurs in unconsolidated alluvial deposits beneath river and stream channels in the valleys and canyons. The San Antonio Creek Basin is on North Vandenberg AFB with agricultural irrigation being the main user of the basin's groundwater. The Vandenberg AFB water supply comes primarily from water provided by the California Central Coast Water Authority, with supplemental supply provided by four wells tapped into the San Antonio Creek groundwater basin. Groundwater quality has decreased slightly in the region due to irrigation. The Vandenberg AFB water treatment plant, however, treats the water to meet water quality requirements of the Federal Safe Drinking Water Act and State drinking water standards.

3.6 AIR QUALITY

Air quality in a given location is described as the concentration of various pollutants in the atmosphere, generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Short-term or long-term effects on air quality is determined by the type and cumulative amount of pollutants emitted into the atmosphere from various sources, the size and topography of the air basin, and the prevailing meteorological conditions. The significance of a pollutant concentration is determined by comparing it to federal and/or state ambient air quality standards. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety.

The U.S. EPA established the federal standards for the permissible levels of certain pollutants in the atmosphere. The National Ambient Air Quality Standards (NAAQS) have been established for seven criteria pollutants: ozone, nitrogen dioxide (NO_2), particulate matter equal to or less than 10 microns in diameter (PM_{10}), particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), and lead. Ozone is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. The ozone precursors are nitrogen oxide (NO_X) and VOCs. Montana, Wyoming, and California have also established specific criteria for ambient air quality. The NAAQS and state level air quality standards are shown in Table 3.6-1.

Areas that meet the NAAQS standard for a criteria pollutant are designated as being "in attainment" while areas where criteria pollutant levels exceed the NAAQS are designated as "nonattainment". Nonattainment classifications for CO and PM_{10} are further divided into moderate and serious categories. Ozone nonattainment areas are further classified, based on the severity of the pollution

Table 3.6-1. National and State Ambient Air Quality Standards

					National Standards	
Pollutant	**Averaging Time**	**CA Standards**	**MT Standards**	**WY Standards**	**Primary[a,b,c]**	**Secondary[a,b,d]**
Ozone	1-hour	0.09 ppm (180 µg/m^3)	0.10 ppm (200 µg/m^3)	--	--	--
	8-hour	--	0.08 ppm (157 µg/m^3)	0.08 ppm (157 µg/m^3)	0.075 ppm (147 µg/m^3)	Same as primary standard
Carbon Monoxide	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	--
	1-hour	20 ppm (23 mg/m^3)	23 ppm (26 mg/m^3)	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	--
Nitrogen Dioxide	Annual Arithmetic Mean	0.030 ppm (56 µg/m^3)	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	53 ppb (100 µg/m^3)	Same as primary standard
	1-hour	0.25 ppm (470 µg/m^3)	0.30 ppm (564 µg/m^3)		100 ppb	--
Sulfur Dioxide	Annual Arithmetic Mean	--	0.02 ppm (60 µg/m^3)	0.02 ppm (60 µg/m^3)	0.075 ppm (147 µg/m^3)	--
	24-hour	0.04 ppm (105 µg/m^3)	0.1 ppm (260 µg/m^3)	0.1 ppm (260 µg/m^3)	0.14 ppm (365 µg/m^3)	--
	3-hour	--	0.5 ppm (1,300 µg/m^3)	0.5 ppm (1,300 µg/m^3)	--	0.5 ppm (1,300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	--	--	--	--
PM_{10}	Annual Arithmetic Mean	20 µg/m^3	50 µg/m^3	50 µg/m^3	--	--
	24-hour	50 µg/m^3	150 µg/m^3	150 µg/m^3	150 µg/m^3	Same as primary standard
$PM_{2.5}$	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3	15 µg/m^3	15 µg/m^3	Same as primary standard
	24-hour	--	65 µg/m^3	35 µg/m^3	35 µg/m^3	Same as primary standard
Lead	30-day	1.5 µg/m^3	--	--	--	--
	Quarterly	--	1.5 µg/m^3	0.15 µg/m^3	0.15 µg/m^3	Same as primary standard
Sulfates	24-hour	25 µg/m^3	--	--	--	--
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)	--	--	--	--
Vinyl Chloride	24-hour	Ppm (26 µg/m^3)	--	--	--	--
Visibility Reducing Particles	8-hour (10 a.m. to 6 p.m., Pacific Standard Time)	In a sufficient amount to produce an extinction coefficient of 0.23 per kilometer-visibility of 10 miles or more due to particles when the relative humidity is less than 70 percent.	--	--	--	--

Notes:
(a) Primary standards define levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards define levels of air quality necessary to protect public welfare (i.e., soils, vegetation, property, and wildlife) from any known or anticipated adverse effects.
(b) The 8-hour primary and secondary ambient air quality standards are met at a monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.075 ppm.
(c) National Primary Standards: The levels of air quality necessary to protect the public health with an adequate margin of safety. Each state must attain the primary standards no later than three years after the state implementation plan is approved by the U.S. EPA.
(d) National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the state implementation plan is approved by the U.S. EPA.

EPA = Environmental Protection Agency
µg/m^3 = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter
NAAQS = National Ambient Air Quality Standards
$PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter
PM_{10} = particulate matter equal to or less than 10 microns in diameter
ppm = parts per million

problem, as either basic, marginal, moderate, serious, severe, or extreme. A maintenance area is an area that has recently been re-designated as an attainment area from a former nonattainment area. However, during the maintenance period, most of the CAA rules for a nonattainment area are still applicable to a maintenance area.

Pre-Deactivation Emissions. Deactivation of the former 400 MS and former 564 MS occurred in 2005 and 2007 respectively; Vandenberg AFB silos have been in caretaker status or recently deactivated. Because the LFs at Vandenberg AFB were test LFs and only used periodically, emissions from the four deactivated silos at Vandenberg AFB were considered negligible. Table 3.6-2 presents estimated emissions from typical helicopter operations and vehicle emissions in the vicinity of the former 400 MS and former 564 MS. Vehicle emissions were estimated by using typical vehicle miles traveled (using an average of 2 million miles per year).

Table 3.6-2. Typical Annual Emissions from LF and MAF Support Aircraft and Vehicles (tons/year)

Source	VOCs	NO_X	PM_{10}	CO	SO_X
UH-1N	0.47	5.93	Neg.	5.77	1.00
Vehicle	1.76	2.65	0.57	22.05	NA
Total	2.23	8.58	0.57	27.82	1.00

Source: F.E. Warren AFB, 2000.

State Implementation Plan. In areas where the NAAQS are exceeded, the CAA requires preparation of a State Implementation Plan (SIP), which details how a state would attain the standards within mandated time frames. The CAA's revised attainment planning process maintains requirements and compliance dates for reaching attainment that are based upon the severity of the air quality standard violation.

Existing Air Quality Conditions. The existing air quality conditions at the area affected by the proposed action are determined by the NAAQS attainment status for the county or region where the installations are located (i.e., Malmstrom AFB in Montana, F.E. Warren AFB in Wyoming, and Vandenberg AFB in California) within which proposed dismantlement activities are proposed.

Clean Air Act Conformity. Section 176c of the CAA instructs a federal agency to deny support for or implementing any federal action within a nonattainment or maintenance area unless the federal agency can determine that the activity will conform to the SIP's purpose of attaining and maintaining the NAAQS (see Table 3.6-1).

The U.S. EPA published final rules on general conformity (40 CFR Parts 51 and 93 in the Federal Register on November 30, 1993 and March 24, 2010) that apply to federal actions in areas designated nonattainment for any of the criteria pollutants under the CAA. These rules specify *de minimis* emission levels by pollutant (Table 3.6-3) to determine the applicability of conformity requirements for a project. As defined in the general conformity rule, a formal conformity determination is required when the annual net total of direct and indirect

Table 3.6-3. De Minimis Threshold in Nonattainment Areas

Pollutant	Degree of nonattainment	De Minimis Level (tons/year)
Ozone (VOCs and NO_x)	Serious	50
	Severe	25
	Extreme	10
	Marginal and Moderate (outside an ozone transport region)	100
	Marginal and Moderate (inside an ozone transport region)	50
CO	All	100
PM_{10}	Moderate	100
	Serious	70
$PM_{2.5}$	Nonattainment	100
SO_2 or NO_2	All	100
Lead	All	25

CO = carbon monoxide
NO_2 = nitrogen dioxide
NO_x = nitrogen oxides
SO2 = sulfur dioxide
$PM_{2.5}$ = particulate matter equal to or less than 2.5 microns in diameter
PM_{10} = particulate matter equal to or less than 10 microns in diameter
VOC = volatile organic compound

emissions from a federal action, occurring in a nonattainment or maintenance area, equals or exceeds the annual de minimis levels for criteria pollutants.

Because the proposed dismantlement activities would occur in attainment areas, the general conformity rule does not apply. Although not directly applicable, air emissions with potential to be generated within the former 564 MS and former 400 MS, and around Vandenberg AFB during dismantlement activities were quantified and addressed in the context of general conformity rule analysis including the use of the applicability emissions thresholds (i.e., de minimis levels), for purposes of NEPA disclosure.

Greenhouse Gas Emission Sources. Greenhouse gases are compounds found naturally in the Earth's atmosphere. The compounds trap infrared heat converted from the sunlight inside Earth's atmosphere. In this way, greenhouse gases act as insulation, and contribute to the maintenance of global temperatures. As the levels of greenhouse gases increase; however, the result is a greater overall temperature on Earth.

The primary long-lived greenhouse gases (GHGs) directly emitted by human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The heating effect from these gases is considered the probable cause of the global warming observed over the last 50 years. The U.S. EPA Administrator has recognized potential risks to public health and welfare of GHGs, and signed an endangerment finding regarding GHGs under Section 202(a) of the CAA (U.S. Environmental protection Agency, 2009), which finds that the current and projected concentrations of the six key well-mixed GHGs (CO_2, CH_4, nitrous oxide, HFCs, PFCs, and SF_6) in the atmosphere threaten the public health and welfare of current and future generations. To estimate global warming potential (GWP), GWPs are expressed relative to a reference gas, CO_2, which is assigned a GWP equal to 1. All six GHGs are multiplied by their GWP and the results are added to calculate the total CO_2 equivalent (CO_2e).

However, even after adjusting for GWP, the dominant GHG emitted is CO_2, mostly from fossil fuel combustion (85.4 percent). Weighted by GWP, CH_4 is the second largest component of emissions, followed by nitrous oxide. Furthermore, among the primary long-lived GHGs directly emitted by human activities, only CH_4 and nitrous oxide have potential to be produced from fossil fuel combustion sources (U.S. Environmental protection Agency, 2009).

Although the U.S. EPA final rule on Mandatory Reporting of Greenhouse Gases (30 October 2009) provides various methodologies to estimate CO_2e based on fuel test and consumption data, this rule is essentially designed for specific stationary facility reporting purposes, and cannot be directly implemented in this EA to address the emissions from mobile construction equipment. Most of the U.S. EPA emission factor tools that are widely used for NEPA study purposes do not provide emission factors for CO_2e other than for CO_2. Therefore, given the lack of regulatory tools to provide reasonable estimates of CO_2e, this EA uses the inventory ratios among CO_2, CH_4, and nitrous oxide summarized in the most recent U.S. EPA inventory report (U.S. Environmental protection Agency, 2009). In the inventory, it shows that the GHG contribution from CH_4 and nitrous oxide is less than 1 percent of the total CO_2e for fossil fuel combustion sources. Given such small contributions from other GHG equivalents compared to CO_2, this EA predicts CO_2e levels in terms of CO_2 levels. The air emissions analysis is included as Appendix A.

3.6.1 Malmstrom AFB

The former 564 MS is situated within the Great Falls Air Quality Control District, which includes Blaine, Cascade, Chouteau, Glacier, Hill, Liberty, Pondera, Teton, and Toole Counties. This area has been identified by the U.S. EPA as being in attainment of the NAAQS.

The *Clean Air Act of Montana* allows the development of local air pollution control programs. As discussed above, Montana has adopted additional state air quality standards, promulgated as the Montana Ambient Air Quality Standards; the standards are shown in Table 3.6-1.

In order to prevent future air quality problems, Montana relies primarily on its permitting program to meet the requirements of the federal CAA Amendments of 1990. This program requires significant stationary sources of air pollution to obtain a permit from the Montana DEQ prior to construction (ARM, 17.8.704 et seq). Montana requires a permit for any stationary source that may emit more than 25 tons per year (tpy) of any criteria air pollutant (except lead, which has a cap of 5 tpy). Montana's permitting program has U.S. EPA approval and operates in lieu of a federal program. There are no additional local requirements for construction. Mobile sources for construction are exempt from this provision. However, it is required that "no person shall operate a construction site or demolition project unless reasonable precautions are taken to control emissions of airborne particulate matter" (ARM 17.8.308).

3.6.2 F.E. Warren AFB

The former 400 MS is situated within the Metropolitan Cheyenne Intrastate Air Quality Control Region, which includes Laramie, Platte, and Goshen Counties. This area has been identified by the U.S. EPA as being in attainment of the NAAQS. As discussed above, the Wyoming DEQ - Air Quality Division, has also adopted additional state air quality standards, termed the Wyoming Ambient Air Quality Standards; the standards are also shown in Table 3.6-1.

Wyoming requirements specify that owners or operators must obtain permits prior to constructing or modifying major sources. A major stationary source is one that belongs to a list of 28 specific categories and that produces 100 tpy or more of any pollutant regulated by the CAA. Sources not on the list are regulated as a major source if potential emissions would exceed 250 tpy. Site dismantlement does not fall into one of the 28 categories nor would produce 250 tpy of a pollutant. Therefore, permitting of dismantlement activities would not be required.

3.6.3 Vandenberg AFB

The LFs are located in the Santa Barbara County Air Pollution Control District (SBCAPCD), which is required to monitor air pollutant levels to ensure federal and state ambient air quality standards are met. If ambient air quality standards are not met, SBCAPCD must develop a plan to meet them. If regional air quality contains pollutant levels violating these standards, the area is classified as a "nonattainment" area.

Ozone Nonattainment. Ozone is not produced directly by any pollutant source. Instead, it is formed by a reaction between NO_X and reactive organic compounds (ROCs) in the presence of sunlight. A reduction in ozone is dependent on a reduction in NO_X and ROC emissions. Reduction of these pollutants has the added benefit of reducing the concentration of PM_{10}.

Santa Barbara County violated the 1-Hour Federal ozone standard in August 2003, when it became a maintenance area. The 1-Hour Federal ozone standard was subsequently revoked, removing Santa Barbara County from maintenance status. In September 2010, Santa Barbara County was identified by U.S. EPA as an area likely to be designated as "marginal non-attainment" under the

.075 ozone standard. The designation process has not been finalized, so as of January 2011, Santa Barbara County is in attainment for the Federal ozone standard. As a consequence, a conformity determination is not required for ozone until one year after any non-attainment designation for ozone in accordance with 42 U.S.C. § 7506(c)(6). Santa Barbara County is designated as being a serious non-attainment area for ozone under the California Clean Air Act state standards.

PM_{10} Nonattainment. The largest source of PM_{10} emissions in the county is entrained paved road dust. Other sources of PM_{10} emissions include dust from construction and demolition, agricultural activities, entrained road dust from unpaved roads, natural dust, and particulate matter released during combustion.

Santa Barbara County exceeds the California Ambient Air Quality Standards (CAAQS) for PM_{10} for 24-hour and annual standards. Exceedances of the annual standard predominantly occur at the downtown Santa Maria monitoring station. Exceedances of the 24-hour standard are more widespread across the county, although they do not occur as frequently.

The SBCAPCD and Vandenberg AFB Memorandum of Agreement outline the administration of SBCAPCD regulations at Vandenberg AFB. This agreement between SBCAPCD and Vandenberg AFB was renegotiated and finalized on June 5, 1998. This agreement states that Vandenberg AFB is designated as a single stationary source.

The SBCAPCD has authority to implement regulations to assure attainment and maintenance of NAAQS by promulgating applicable sections of a SIP. As part of the SIP, California has incorporated the General Conformity Rule. The U.S. EPA Conformity Rule, 40 CFR Part 93, Subpart B, and 40 CFR Part 51, Subpart W, implements Section 176(c) of the CAA, as amended in 42 U.S.C. 7506(c). Conformity to the SIP is defined in the federal CAA as requiring federal agencies to ensure that any agency activity conform with an approved SIP in nonattainment or maintenance areas. Compliance with the SIP assists in eliminating or reducing the number of violations of the NAAQS, which expedites attainment of the standards. The Air Force is responsible for determining if the proposed dismantlement activities at Vandenberg AFB conform with the SIP.

3.7 NOISE

Noise is defined as any unwanted sound that interferes with normal activities or in some way reduces the quality of the environment. Ambient noise levels vary greatly in magnitude and character from one location to another, depending on the normal activities conducted in the area.

Noise is defined as sound that is undesirable because it interferes with speech communication and hearing, is intense enough to damage hearing, or is otherwise annoying. The decibel (dB), a logarithmic unit that accounts for the large variations in amplitude, is the accepted standard unit for the measurement of sound. A-weighted sound levels (dBAs) are commonly used to account for the frequency response to the human ear. The day-night average sound level (DNL)

was developed to evaluate the total community noise environment and is an accepted unit for quantifying human annoyance to general environmental noise. However, in California, a descriptor similar to DNL is used to evaluate impacts due to noise. The Community Noise Equivalent Level (CNEL) is similar to the DNL with the exception that there is a 5-dB penalty added to those noises occurring during evening hours (7:00 p.m. to 10:00 p.m.). Both DNL and CNEL represent a 24-hour average of the A-weighted noise levels at a particular location. For most transportation and community noise sources, the CNEL and DNL are equal, to within 1 dB.

The California Department of Health, Office of Noise Control, has developed land use compatibility guidelines. These guidelines determine the ranges of acceptable levels for noise-sensitive receptors similar to those presented in Federal Aviation Administration-developed land use compatibility guidelines. The most relevant difference between the two guidelines is the acceptable level for residential land uses. The federal guidelines indicate that 65 dB is the maximum acceptable exterior noise level compatible with residential land uses, whereas the California guidelines establish 60 dB as the maximum normally acceptable level.

3.7.1 Malmstrom AFB

The ROI for the noise analysis is the former 564 MS area, focusing on the areas associated with the specific LFs and MAFs.

3.7.1.1 Existing Noise Conditions.

Traffic in the area of the former 564 MS is sporadic, with nearly all the roads operating freely with no traffic delays. The use of large vehicles (missile transporter-erectors, payload transporter) no longer takes place due to deactivation of the 564 MS in 2007. As a result, background noise levels in the area are similar to those in other rural areas. Agricultural/ranch lands typically have background noise levels of approximately 40 to 48 dBA. Average noise levels temporarily increase and approach 50 dBA as traffic proceeds through the area.

3.7.1.2 Noise Sensitive Receptors.

A noise sensitive receptor is commonly defined as the occupants of any facility where a state of quietness is a basis for use, such as a residence, school, hospital, or church. The key receptors to noise impacts would likely be residents living near LFs, where most of the dismantlement activities would occur. The closest towns to LFs within the 564 MS are Valier (one mile from T-43), Conrad (two miles from S-39), Pendroy (three miles from T-46), Shelby (four miles from P-10 and Q-18), Brady (five miles from S-33, S-36 and S-38) and Choteau (ten miles from S-32). No inhabited structures are within 1,750 feet of any LF based on the quantity of conventional munitions that were once on site.

3.7.2 F.E. Warren AFB

The ROI for the noise analysis is the former 400 MS area, focusing on the areas associated with the specific LFs and MAFs.

3.7.2.1 Existing Noise Conditions.

Traffic in the area of the former 400 MS is sporadic, with nearly all the roads operating freely with no traffic delays. The use of large vehicles (missile transporter-erectors, payload transporter) no longer takes place due to deactivation of the 400 MS in 2005. Therefore, background noise levels in the area are similar to those in other rural areas. Agricultural/ranch lands typically have background noise levels of approximately 40 to 48 dBA. Average noise levels temporarily increase and approach 50 dBA as traffic proceeds through the area.

3.7.2.2 Noise Sensitive Receptors.

As stated previously, the key receptors to noise impacts would likely be residents living near LFs, where most of the dismantlement activities would occur. The closest towns to LFs within the former 400 MS are Wheatland (two and one-half miles from T-10), Chugwater (two miles from Q-2), Yoder (four miles from S-3 and S-11), Torrington (two and one-half miles from S-2), Cottier (two miles from S-2), Lyman (two miles from S-4), and Hawk Springs (two miles from S-6). No inhabited structures are within 1,750 feet of any LF based on the quantity of conventional munitions that were once on site. An unoccupied ranch house is located approximately 1,630 feet from LF Q-5. A cemetery is located approximately 1,600 feet from LF P-6.

3.7.3 Vandenberg AFB

The ROI for the noise analysis is the northern portion of Vandenberg AFB, focusing on the areas associated with the specific LFs.

3.7.3.1 Existing Noise Conditions.

Aircraft using the Vandenberg AFB airfield are a source of noise in the ROI. Missile launches are more intense sources of noise in the region; however, launches occur only occasionally, and are of limited duration. Currently, Delta II, Peacekeeper, Minuteman, and Taurus missiles as well as Missile Defense Agency Ground Based Interceptor tests are launched from northern Vandenberg AFB (Vandenberg AFB, 2011a).

Noise monitoring of Vandenberg AFB and surrounding areas showed average ambient noise levels of 48-67 dBA, which are typical of residential and urban areas. Rural and isolated areas of Vandenberg AFB would have average noise levels less than 45 dBA (Vandenberg AFB, 1997b).

3.7.3.2 Noise Sensitive Receptors.

Due to the isolated nature of the LF sites on Vandenberg AFB, no sensitive receptors (i.e., residences, hospitals, or churches) are located in the vicinity of the LF sites.

3.8 BIOLOGICAL RESOURCES

Biological resources include the native and introduced plants and animals within the project area. For discussion purposes, these are divided into vegetation, wildlife, threatened and endangered species, and sensitive habitats.

Relevant legislation pertaining to biological resources are briefly discussed below.

The Endangered Species Act (16 U.S.C. Sections 1531-1544) is intended to protect, maintain, and restore ecosystems upon which threatened and endangered species depend, to provide for the conservation of threatened and endangered species, and to take steps appropriate to achieve these purposes.

The Migratory Bird Treaty Act (16 U.S.C. Sections 703-712) stipulates that migratory birds and their parts (including eggs, nests, and feathers) are fully protected. The Act implements the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to any two or more countries.

The Sikes Act (16 U.S.C. 670a-670o, 74 Stat. 1052), as amended (P.L. 86-797, approved September 15, 1960) provides for cooperation by the Departments of the Interior and Defense with State agencies in planning, development, and maintenance of fish and wildlife resources on military reservations throughout the United States.

The Marine Mammal Protection Act (16 U.S.C. 1361-1407, P.L. 92-522, October 21, 1972, 86 Stat. 1027) established a Federal responsibility to conserve marine mammals with management vested in the Department of Interior for the sea otter and the Department of Commerce for cetaceans and pinnipeds, other than the walrus. The 1976 amendments (P.L. 94-265) clarified the offshore jurisdiction of the statute as the 200-mile Exclusive Economic Zone. The Marine Mammal Protection Act Amendments of 1994 (P.L. 103-238, April 30, 1994, 108 Stat. 532) clarify that the Secretary of Commerce has the authority to protect essential marine mammal habitat.

Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) and contact with the Montana Department of Natural Resources, Wyoming Game and Fish Department, and California Department of Fish and Game was conducted to obtain information on state- and federally-listed threatened and endangered species potentially occurring in the vicinity of the former 564 MS, former 400 MS, and Vandenberg AFB. The result of this consultation is provided in the paragraphs below.

3.8.1 Malmstrom AFB

Human activity has altered the natural environment at the LFs and MAFs through grading, graveling, and paving of the sites.

The ROI for biological resources includes those portions of the 4-county area where LFs and MAFs of the former 564 MS are situated, focusing on the actual developed site of the LFs and MAFs. This ROI includes the area within which potential impacts could occur and provides a basis for evaluating the level of impact.

3.8.1.1 Vegetation.

The majority of the ROI consists of gently rolling terrain that is dominated by short- and mixed grass prairie habitat, rangeland, and cropland (mostly wheat). There are lacustrine and riverine habitats within the ROI that would include riparian-type vegetation. The western portion of the ROI includes the Rocky Mountain Front.

The short- and mixed grass prairie habitats support western wheat grass (*Agropyron smithii*), blue bunch wheat grass (*Agropyron spicatum*), needle-and-thread grass (*Hesprostipa comata*), Junegrass (*Koeleria macrantha*), Kentucky blue grass (*Poa pratensis*), fescue (*Festuca* sp.), little bluestem (*Schizachyrium scoparium*), and blue gramma (*Bouteloua gracilis*) (Malmstrom AFB, 2011a).

Riparian habitats within the ROI are dominated by cottonwood (*Populus* sp.) and could include a coniferous component such as spruce (*Picea* sp.) or pine (*Pinus sp*.). The understory shrub layer could support red-osier dogwood (*Cornus sericea*), alder (*Alnus* sp.), willow (*Salix* sp.), and service berry (*Amelanchier* sp.) (Malmstrom AFB, 2011a).

The LFs and MAFs are mostly devoid of vegetation for security purposes. LFs contain no vegetation. MAFs are primarily paved or gravel with some areas of grass that are mowed.

3.8.1.2 Wildlife.

Common wildlife that could occur regionally within the ROI include the ferruginous hawk (*Buteo regalis*), Swainson's hawk (*Buteo swainsoni*), golden eagle (*Aquila chrysaetos*), sage grouse (*Centrocercus urophasianus*), mountain plover (*Charadrius motanus*), white tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), prairie dog (*Cynomys* sp.), badger (*Taxidea taxus*), raccoon (*Procyon lotor*), deer mouse (*Peromyscus* sp.), ground squirrel (*Spermophilus* sp.), coyote (*Canis latrans*), bobcat (*Lynx rufus*), cougar (*Puma concolor*), and western rattlesnake (*Crotalus viridis*) (Malmstrom AFB, 2011a). The MAFs and LFs are located in rural agricultural and rangeland areas, however; they are fenced, restricted access areas where only birds and small mammals such as mice, ground squirrels, or rabbits are found.

3.8.1.3 Threatened and Endangered Species.

Federally threatened and endangered species that occur or have the potential to occur within the ROI are listed in Table 3.8-1. In addition to the federally threatened and endangered species that have the potential to occur within the ROI, there are also a variety of state Species of Concern. The state of Montana defines Species of Concern as native animals breeding in the state that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution.

Table 3.8-1. Federally Threatened and Endangered Species within the Former 564 MS Area

Common Name	Scientific Name	Federal Status
Birds		
Piping plover	*Charadrius melodus*	T
Sprague's pipit	*Anthus spragueii*	Candidate
Mammals		
Grizzly Bear	*Ursus arctos horriblis*	T
Canada lynx	*Lynx canadensis*	T
Black-footed ferret	*Mustela nigripes*	E
Fish		
Bull Trout	*Salvelinus confluentus*	T

E = endangered T = threatened

Source: Malmstrom AFB, 2011a; U.S. Fish and Wildlife Service, 2011c.

State species of concern include the spotted bat (*Euderma maculatum*) and Preble's shrew (*Sorex preblei*). Habitat for the spotted bat is most often in rough, rocky, semiarid, and arid terrain, varying from ponderosa pine forest to scrub habitat and open desert. The bat typically roosts in high cliffs and forages over open forests and fields in drier ponderosa pine forests. Habitat for the Preble's shrew is most often rock fields, prairies, and forests at high elevations (Malmstrom AFB, 2011a).

Based on information included in the Malmstrom AFB Integrated Natural Resources Management Plan (INRMP) (Malmstrom AFB, 2011a), there are no federally or state-listed species of concern or designated critical habitat within the boundaries of the LFs or MAFs of the former 564 MS. A letter issued by the USFWS (dated 7 February 2011) supports this determination (U.S. Fish and Wildlife Service, 2011a).

3.8.1.4 Sensitive Habitats.

Sensitive habitats include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer/winter habitat). As discussed above, due to the maintained condition (e.g., gravel, paved, and mowed grasses) at the LF and MAF locations, there are no sensitive habitats available at the specific LF and MAF locations. Sensitive habitat in the vicinity of LFs and MAFs include wetlands.

Wetlands. Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Interagency Committee for Wetland Delineation, 1989). Wetlands are regulated under Section 404 of the CWA and Executive Order (EO) 11990 (Protection of Wetlands). Areas that are periodically wet, but do not meet all three criteria (hydrophytic vegetation, hydric soils, and wetland hydrology), are not jurisdictional wetlands subject to Section 404 of the CWA.

The ROI contains both riverine and lacustrine habitats that could potentially fall under the above described wetland definition. However, no jurisdictional wetlands have been identified within the boundaries of the LFs and MAFs.

3.8.2 F.E. Warren AFB

Human activity has altered the natural environment at the LFs and MAFs through grading, graveling, and paving of the sites. The ROI for biological resources includes those portions of the 3-county area where LFs and MAFs of the former 400 MS are situated, focusing on the actual developed site of the LFs and MAFs. Relevant legislation pertaining to biological resources are the same as those discussed in Section 3.8.1.

3.8.2.1 Vegetation.

The majority of the ROI consists of grassland, meadow, shrubland, woodland, and rock outcrops. Mixed and short-grass prairies and introduced grassland represent the grassland types that occur within the former 400 MS. Mixed-grass prairie is the least common and occurs primarily where grazing pressure is low or excluded. Swales and low areas within the mixed-grass prairie are dominated by western wheatgrass (*Agropyron smithii*). Hilly areas with steeper slopes and rocky soils support fendler three-awn (*Aristida fendleriana*), Hood's phlox (*Phlox hoodii*), milkvetch (*Astragalus* spp.), and wild buckwheat (*Eriogonum* sp.). Shrubs, including silver sagebrush (*Artemisia cana*) and Spanish bayonet (*Yucca glauca*), are located within the grasslands. The short-grass prairie native vegetation is dominated by buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*). Other grass and grass-like species present in areas of low grazing, sandy soils, swales, bottomlands, and drainages include western wheatgrass (*Agropyron smithii*), June grass (*Koeleria macrantha*), Indian ricegrass (*Oryzopsis hymenoides*), and needle-and-thread grass (*Stipa comata*). Meadow vegetation in the former 400 MS area is limited to areas near creeks and around ponds. Common species include bluegrass (*Poa* spp.), thistle (*Cirsium* spp.), goldenrod (*Solidago* sp.), and death camus (*Zygadenus elegans*). Shrub species occur on rocky slopes at higher elevations within the deployment area. Dominant shrub species include mountain mahogany (*Cercocarpus montanus*), skunkbush (*Rhus trilobata*), wood rose (*Rosa woodsii*), copper mallow (*Sphaeralcea coccinea*), and James wild buckwheat (*Eriogonum jamesii*). Rock outcrops support plants with low moisture requirements and wind tolerance such as cryptantha (*Cryptantha* spp.) (F.E. Warren AFB, 2000).

The LFs and MAFs are mostly devoid of vegetation for security purposes. LFs contain no vegetation. MAFs are primarily paved or gravel with some areas of grass that are mowed.

3.8.2.2 Wildlife.

Common wildlife that could occur regionally within the ROI include the pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), spotted skunk (*Spilogale putorius*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), swift fox (*Vulpes velox*), long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitus mephitus*), badger (*Taxidea taxus*), and mink (*Mustela vison*). Jackrabbits and cottontails are found in the area as well as burrowing rodents such as ground squirrels, prairie dogs, pocket gophers, and other smaller species. The former 400 MS area is located in the Central Flyway, and is in one of the prime waterfowl production areas of the U.S. Common waterfowl include Canada goose (*Branta canadensis*), snow goose (*Chen caerulescens*), mallards (*Anas platyrhynchos*), northern pintail (*Anas acuta*), wood duck (*Aix sponsa*), teal (*Querquedula discors*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), canvasback (*Aythya vallsineria*), redhead (*Aythya americana*), and scaup (*Aythya* sp.). Upland game birds include the sage grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Tympanuchus phasianellus*), gray partridge (*Perdix perdix*), and ring-necked pheasant (*Phasianus colchicus*) (F.E. Warren AFB, 2000). The MAFs and LFs are located in rural agricultural and rangeland areas, however; they are fenced, restricted access areas where only birds and small mammals such as mice, gophers, or rabbits are found.

3.8.2.3 Threatened and Endangered Species.

Federally threatened and endangered species that occur or have the potential to occur within the ROI are listed in Table 3.8-2.

Based on information included in the F.E. Warren AFB INRMP and the maintained condition (e.g., gravel, paved, and mowed grasses) at the LF and MAF locations, there are no known federally or state-listed species of concern or designated critical habitat within the LFs or MAFs of the former 400 MS.

3.8.2.4 Sensitive Habitats.

Sensitive habitats include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer/winter habitat). As discussed above, due to the maintained condition (e.g., gravel, paved, and mowed grasses) at the LF and MAF locations, there are no sensitive habitats available at the specific LF and MAF locations. Sensitive habitat in the vicinity of LFs and MAFs include wetlands.

Wetlands. The ROI contains both riverine and palustrine habitats, predominately in the Laramie Plains and the North Platte River drainage. Wyoming wetlands are associated primarily within four major river drainage

Table 3.8-2. Federally Threatened and Endangered Species within the Former 400 MS Area

Common Name	Scientific Name	Federal Status
Birds		
Greater Sage-grouse	*Centrocercus urophasianus*	Candidate
Piping plover	*Charadrius melodus*	T
Mountain plover	*Charadrius montanus*	Species of Concern
Least tern	*Sterna antillarum*	E
Whooping crane	*Grus americana*	E
Mammals		
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	T
Fish		
Pallid sturgeon	*Scaphirhynchus albus*	E
Plants		
Ute ladies'-tresses	*Spiranthes diluvialis*	T
Colorado butterfly plant	*Gaura neomexicana coloradensis*	T
Blowout penstemon	*Penstemon haydenii*	E
Western prairie fringed orchid	*Platanthera praeclara*	T

E = endangered
T = threatened

Source: F.E. Warren AFB, 2000; U.S. Fish and Wildlife Service, 2011d.

systems: the Snake, Colorado, Missouri, and Platte. Other wetlands are commonly associated with irrigation projects located in the Platte, Bighorn, and Wind River drainages. However, no jurisdictional wetlands have been identified within the boundaries of the LFs and MAFs (F.E. Warren AFB, 2000).

3.8.3 Vandenberg AFB

Human activity has altered the natural environment at the LFs through grading and paving of the sites. The ROI for biological resources includes the area in the immediate vicinity of LFs, focusing on the actual developed site of the LFs. Relevant legislation pertaining to biological resources are similar to those discussed in Section 3.8.1. Additional legislation pertaining to Vandenberg AFB includes the Magnuson-Stevens Fishery Conservation and Management Act that was passed in 1976 to provide the National Marine Fisheries Service (NMFS) legislative authority for fisheries regulations in the United States; in the area between three miles to 200 miles offshore. The Pacific Fishery Management Council covers the area offshore of the states of California, Oregon, and Washington. Councils prepare Fishery Management Plans that are submitted to the NMFS for approval. In 1996, the Magnuson-Stevens Fishery Conservation and Management Act was reauthorized and changed extensively by amendments called the Sustainable Fisheries Act. Among other changes, these amendments emphasize the importance of habitat protection to healthy fisheries and strengthen the ability of the NMFS and Councils to protect the habitat needed by the fish they manage. The habitat is called "Essential Fish Habitat" and is broadly defined to include those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

3.8.3.1 Vegetation.

The majority of the ROI consists of coastal sage scrub, nonnative grasslands, and ruderal plant communities. Coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), and poison hemlock (*Conium maculatum*) are common species in the area (Vandenberg AFB, 2011a). Many of the grasslands on the base are composed primarily of nonnative annual grass species such as wild oats (*Avena* spp.), barley (*Hordeum* spp.), bromes (*Bromus* spp.), and fescue (*Festuca* spp.) and forbs such as *Erodium* species, bur clover (*Medicago polymorpha*), shortpod mustard (*Hirschfeldia incana*), and black mustard (*Brassica nigra*) (AECOM, 2012a). Ruderal plant species such as California matchweed (*Gutierrezia californica*), goldenbush (*Ericameria* sp.), and common tarplant are scattered throughout the area (Vandenberg AFB, 2011a). Other portions of the ROI consists of seabluff scrub dominated by California saltbush (*Atriplex californica*), California sagebrush, coyote brush, giant coreopsis (*Coreopsis gigantea*), California brittlebush (*Encelia californica*), seacliff buckwheat (*Eriogonum parvifolium*), coastal golden yarrow (*Eriophyllum staechadifolium*), and coastal goldenbush (*Isocoma menziesii*) (AECOM, 2012a). The LFs are primarily asphalt-paved with some areas of grass that are mowed. A 25-foot fuelbreak (maintained by blading) also extends beyond the perimeter security fencing of each LF.

3.8.3.2 Wildlife.

Vandenberg AFB plant communities provide habitat for many resident and migratory animals. The western fence lizard (*Sceloporus occidentalis*), garter snake (*Thamnophis sirtalis*), western diamondback rattlesnake (*Crotalus oreganus*), pocket gopher, California ground squirrel (*Otospermophilus beecheyi*), and deer mouse (*Peromyscus maniculatus*) are typical examples of smaller wildlife species that can be found in the ROI. Also common are brush rabbit (*Sylvilagus bachman*), badger (*Taxidea taxus*), and mule deer (*Odocoileus hemionus*). Birds such as ring-billed (*Larus delawarensis*), Heerman's (*Larus heermanni*), and glaucous-winged gulls (*Larus glaucescens*), as well as the western wood-pewee (*Contopus sordidulus*), rhinoceros auklet (*Cerorhinca monocerata*), red-winged blackbird (*Agelaius phoeniceus*), western meadowlark (*Sturnella neglecta*), red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), peregrine falcon (*Falco peregrines*), and golden eagle (*Aquila chrysaetos*) have also been sighted in the area.

Because Vandenberg AFB is near the southern limit of the breeding ranges for many seabird species, a long-term program was begun in 1999 to annually monitor population dynamics and breeding biology of seabirds breeding on Vandenberg AFB. The loggerhead shrike (*Lanius ludovicianus*) and the western burrowing owl (*Athene cunicularia hypugea*) could potentially be present in the ROI. Both species are listed as federal special concern species, as well as California Species of Concern.

At least 34 species of marine mammals have been identified from sightings or strandings in the Southern California Bight (Bonnell and Dailey, 1993). These include various members of the Order Cetacea for toothed whales (*Suborder Odontoceti*) and baleen whales (*Suborder Mysticeti*), as well as members of the Order Carnivora for seals and sea lions (*Suborder Pinnipedia*) and sea otters (*Suborder Fissipedia*). Some of the species are migrants that pass through the area on their way to calving or feeding grounds located elsewhere. Some are seasonal visitors that remain for only a few weeks to exploit a particular food resource. Other species have resident populations in the area for many months or year-round. Species that reside in the waters offshore of Vandenberg AFB are not anticipated to be affected from onshore dismantlement activities.

The Pacific harbor seal (*Phoca vitulina*) is a resident species of Point Sal, located approximately 2 miles from the ROI. Counts of harbor seals performed at nine main haulout sites along the coast of Vandenberg AFB average 327 seals. During surveys conducted in March and April 2002, a new harbor seal haulout site was discovered that is regularly used by harbor seal mothers and their pups. This site, designated as Lion's Head, is approximately 1.5 miles from the ROI. The largest number of harbor seals is found at Lion's Head between September and January. Most harbor seal pupping occurs in March with a 4- to 6-week weaning period. The California sea lion (*Zalophus californianus californianus*) does not breed on Vandenberg AFB, but is found along the coastline during the summer. Point Sal, which is north of the Base boundary, is the closest area used as a haulout by the California sea lion.

Other pinnipeds such as the elephant seal and northern fur seal are observed periodically on the base and can be found in nearby haulout/rookery areas, preferring undisturbed sections of mainland coast and offshore islands or rocks.

Essential Fish Habitat includes those waters and substrate (sediment, hard bottom) necessary to the complete life cycle of fish, from spawning to maturity. The east-west boundary for coastal pelagic species (Pacific sardine and mackerel, northern anchovy, jack mackerel, and squid), groundfish (including species of rockfish, shark, and cod), and highly migratory fish (tunas, marlin, and swordfish) includes marine and estuary waters from the coast of California to the limits of the Exclusive Economic Zone (the 200-mile limit) where the United States has exclusive authority over fishing management (Vandenberg AFB, 2011a).

Bat species known to be present on Vandenberg AFB and that may be present at the LF locations include the Mexican free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), Hoary bat (*Lasiurus cinereus*), and two state-listed special concern species, the pallid bat (*Antrozous pallidus*) and Townsend's big-eared bat (*Corynorhinus townsendii*).

3.8.3.3 Threatened and Endangered Species.

Federally threatened and endangered species that occur or have the potential to occur within the ROI are listed in Table 3.8-3.

Table 3.8-3. Federally Threatened and Endangered Species within the ROI, Vandenberg AFB

Common Name	Scientific Name	Federal Status	State Status
Amphibians			
California tiger salamander	*Ambystoma californiense*	T	T
California red-legged frog	*Rana draytonii*	T	--
Reptiles			
Leatherback sea turtle	*Dermochelys coriacea*	E	--
Birds			
Western snowy plover	*Charadrius alexandrinus nivosus*	T	--
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E
California least tern	*Sternula antillarum browni*	E	E
Invertebrates			
Black abalone	*Haliotis cracherodii*	E	--
Vernal pool fairy shrimp	*Branchinecta lynchi*	T	--
El Segundo blue butterfly	*Euphilotes battoides allyni*	E	--
Fish			
Tidewater goby	*Eucyclogobius newberryi*	E	--
Unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*	E	E
Southern steelhead - southern California DPS	*Oncorhynchus mykiss irideus*	E	--
Mammals			
Southern (California) sea otter	*Enhydra lutris nereis*	T	--
Plants			
Surf thistle	*Cirsium rhothophilum*	--	T
La Graciosa thistle	*Cirsium scariosum var. loncholepis*	E	T
Seaside bird's-beak	*Cordylanthus rigidus* ssp. *littoralis*	--	E
Gaviota tarplant	*Deinandra increscens* ssp. *villosa*	E	E
Beach spectaclepod	*Dithyrea maritima*	--	T

E = endangered T = threatened

Source: Vandenberg AFB, 2011a; U.S. Fish and Wildlife Service, 2011b; California Department of Fish and Game, 2011.

Vandenberg AFB maintains a Programmatic Biological Opinion (PBO) (8-8-09-F-10) issued by the USFWS for base operations including missile and space launches, airfield and flight test operations, helicopter operations, infrastructure support and development, demolition of structures and buildings, landscaping, etc. (U.S. Fish and Wildlife Service, 2011b). The PBO addresses potential effects to the federally threatened California red-legged frog (*Rana aurora draytonii*), vernal pool fairy shrimp (*Branchinecta lynchi*), western snowy plover (*Charadrius alexandrines nivosus*), and southern sea otter (*Enhydra lutris nereis*), and the federally endangered beach layia (*Layia carnosa*), Gambel's watercress (*Nasturtium gambelii*), Gaviota tarplant (*Deinandra increscens* ssp. *villosa*), Lompoc yerba santa (*Eriodictyon capitatum*), El Segundo blue butterfly (*Euphilotes battoides* ssp. *allyni*), tidewater goby (*Eucyclogobius newberryi*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), California least tern (*Sterna antillarum browni*), southwestern willow flycatcher (*Empidonax traillii extimus*), and California brown pelican (*Pelecanus occidentalis*).

Based on information included in the Vandenberg AFB INRMP (Vandenberg AFB, 2011a), there are no federally or state-listed species of concern or designated critical habitat on the LFs. However, Gaviota tarplant (*Deinandra increscens* ssp*. villosa*) (Federally Endangered, California Endangered) is located approximately 50 meters (165 feet) southeast of the LF-06 paved area and within 40 meters (130 feet) of the access road and seacliff buckwheat (host plant for the Federally Endangered El Segundo blue butterfly [*Euphilotes battoides allyni*]) is located approximately 135 meters northeast of the edge of LF-05 and approximately 60 meters (197 feet) northeast of Point Sal Road (AECOM, 2012a).

3.8.3.4 Sensitive Habitats.

Sensitive habitats include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer/winter habitat).

There are 3 miles of coastline designated as a marine ecological reserve; including a beach area south of Rocky Point used by harbor seals as haul-out and pupping areas. Seabird nesting and roosting areas are situated on the Channel Islands and on Vandenberg AFB. White-tailed kite foraging habitat includes grassland and open coastal sage scrub. Wetlands have been mapped by the USFWS on Vandenberg AFB and the Santa Ynez River watershed drains approximately 900 square miles of land; approximately 45 square miles of which occur on Vandenberg AFB. The river supports many sensitive species, and becomes intermittent during the summer as water levels drop. Several plant communities that occur on Vandenberg AFB are also considered sensitive because they contain sensitive plant species and/or are of limited extent (e.g., seacliff buckwheat, which is the host plant for the Federally Endangered El Segundo blue butterfly). These include riparian woodlands and associated freshwater herbaceous vegetation. However, no jurisdictional wetlands or other sensitive habitats have been identified within the boundaries of the LFs.

3.9 CULTURAL RESOURCES

Cultural resources are defined as prehistoric or historic archaeological sites, buildings, structures, districts, artifacts, or other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. For ease of discussion, cultural resources have been divided into prehistoric and historic archaeological resources, historic buildings and structures, and traditional cultural resources (e.g., sacred or ceremonial sites).

For the purposes of this analysis, the term ROI is synonymous with the “area of potential effect” as defined under cultural resources legislation. The ROI for the analysis of cultural resources within this EA includes any structures and areas that may be affected by dismantlement activities. This would entail the LF and MAF locations.

Numerous laws and regulations require federal agencies to consider the effects of a proposed action on cultural resources. These laws and regulations stipulate a process for compliance, define the responsibilities of the federal agency proposing the action, and prescribe the relationships among other involved agencies (e.g., the SHPO, the Advisory Council on Historic Preservation [Advisory Council]). The primary law governing the treatment of cultural resources is the National Historic Preservation Act (NHPA), which requires a federal agency to consider potential impacts on historic properties from any proposed undertaking.

Cultural resources determined to be significant as they are defined in the regulations at 36 CFR Part 800.16(1)(1) are subject to protection or consideration by a federal agency. Cultural resources that are listed or eligible for listing in the National Register of Historic Places (National Register), whether they are prehistoric, historic, or traditional in nature, are referred to as "historic properties." Historic properties, under 36 CFR Part 800 are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register. For the purposes of these regulations, the term also includes artifacts, records, and remains that are related to, and located within, such properties. The term "eligible for inclusion in the National Register" includes properties formally determined as such by the Secretary of the Interior and all other properties that meet National Register listing criteria, whether or not a formal eligibility determination has been made. Any project ("undertaking") with the potential to affect historic properties are subject to the consultation requirements of Section 106 of the NHPA. Sites that meet the criteria, but are not yet evaluated, may be considered potentially eligible to the National Register and, as such, are afforded the same regulatory consideration as nominated or listed historic properties. As a federal agency, the Air Force is responsible for identifying any effects to historic properties from its actions. Pursuant to the NHPA, consultation, as directed by the Section 106 review process, has been completed with the Montana SHPO, Wyoming SHPO, and California SHPO. Additionally, contact with appropriate Native American organizations was made regarding potential traditional cultural resources. The results of these consultations is provided in the paragraphs below.

3.9.1 Malmstrom AFB

3.9.1.1 Prehistoric and Historic Archaeological Resources.

When the LFs and MAFs were constructed, they were excavated and backfilled with soil from the site and from off site. This construction procedure virtually eliminated the possibility that intact undiscovered archaeological resources exist at the LFs and MAFs. Malmstrom AFB has obtained Montana SHPO concurrence that there is practically no possibility of finding archaeological resources at the LF and MAF sites (Malmstrom AFB, 2009i).

3.9.1.2 Historic Buildings and Structures.

In 1959, the Air Force Ballistic Missile Committee selected Malmstrom AFB to host the first Minuteman ICBM base. In 1961, construction began on the first

Minuteman missile launch facility, and the 341st Strategic Missile Wing was activated as the Air Force's first Minuteman ICBM wing. The installation and deployment of the Minuteman missiles was accelerated when Russian Intermediate Range Ballistic Missiles were discovered in Cuba in October 1962. On October 26, 1962, the first Minuteman LF (A-6) was placed on strategic alert during the height of the Cuban Missile crisis. The remaining nine missiles of the Alpha Flight became operational shortly thereafter, with the last missile (and the entire flight) going on strategic alert on November 10, 1962. The Minuteman missiles at Malmstrom AFB are credited with helping to peacefully end the Cuban Missile Crisis standoff by increasing America's strategic military advantage over the Soviet Union (Malmstrom AFB, 1997). The 10th MS received its final flight of missiles on February 28, 1963, and two months later, the 12th MS became 100 percent combat ready. In July 1963, the 490th MS became fully operational, giving the 341st Strategic Missile Wing responsibility for 150 LFs. Construction of the final 50 LFs began in 1965 and the 564 MS was operational by April 1966. By 1967 the current configuration of 200 LF and 20 MAFs was completed (Malmstrom AFB, 2007a).

An intensive survey, inventory, and evaluation of the Malmstrom AFB Cold War resources was conducted in 1996 (including Missile Complex facilities). The Base and Missile Cold War Survey (Malmstrom AFB, 1997) identified a number of buildings and facilities as potentially eligible for listing in the National Register due to their Cold War significance. Four MAFs (A-1, F-1, M-1, and P-0) and four LFs (A-6, F-8, M-5, and P-4), one each in each MS, were evaluated. Only MAF A-1 and LF A-6 were recommended for nomination to the National Register based on the critical role that they played in the Cuban Missile Crisis and based on the fact that they were the first Minuteman MAF and one of the first Minuteman LFs, respectively (Malmstrom AFB, 1997). Subsequently, they were formally determined by the Montana SHPO to be eligible for the National Register. The Air Force and the Montana SHPO have entered into a Programmatic Agreement (PA) regarding the exterior maintenance of MAF A-1 and LF A-6 (Malmstrom AFB, 2002b).

The Air Force has consulted with the Montana SHPO and the Advisory Council pursuant to 36 CFR Part 800 regulations implementing Section 106 of the NHPA, (16 U.S.C. 470f) regarding the Air Force determination that the Minuteman III missile system, 564 MS, is eligible for inclusion on the National Register under Criterion A for its association with significant U.S. military missile activities and paradigms during the period from 1962 to 1989 and Criterion C for its technological design and function. The Montana SHPO has concurred with the Air Force determination of eligibility. The Air Force and Montana SHPO have agreed that the artwork located within the 564 MS MAFs and LFs is of historic importance and should be preserved through pictures and other appropriate documentation.

An MOA between the Air Force, Montana SHPO, and Advisory Council has been developed to document the accepted measures (Historic American Building Survey [HABS]/Historic American Engineering Record [HAER] recordation, creation of a 564 MS brochure, the preservation of an active LF [Alpha-06] and

MAF [Alpha-01], and displays at the Malmstrom AFB Museum) for the inactivation of the 564 MS (Malmstrom AFB, 2007b). Measures stipulated in the MOA have been completed.

3.9.1.3 Traditional Cultural Resources.

Traditional resources are associated with cultural practices and beliefs of a living community that are rooted in its history and are important in maintaining the continuing cultural identity of the community. They may include archaeological resources, locations of historic events, sacred areas, sources of raw materials, topographic features, traditional hunting or gathering areas, and native plants or animals.

There are no known traditional cultural resources at the LF or MAF locations. Because of site disturbance that occurred during their construction, it is unlikely that any culturally sensitive areas that would be subject to the American Indian Religious Freedom Act (AIRFA) or the Native American Graves Protection and Repatriation Act (NAGPRA) remain at the LF and MAF sites.

The Air Force conducted consultations with representatives of Native American groups as required under AIRFA. The purpose of these consultations was to determine AIRFA-related concerns such as access to sites of past cultural activity, landforms, and components of the natural environment which may occur at LF or MAF locations within the deployment area of the former 564 MS and are important to traditional religious practices of Native American groups. The Native American groups consulted include the Blackfeet Nation, Flathead Indian Nations, and Rocky Boys Reservation (Chippewa-Cree). The Native American groups contacted expressed no interest in the LF or MAF locations within the former 564 MS deployment area.

3.9.2 F.E. Warren AFB

3.9.2.1 Prehistoric and Historic Archaeological Resources.

Prehistoric sites exist in the missile system deployment area near streams and other water sources (F.E. Warren AFB, 2000). Road and silo construction for the Atlas missile in the late 1950's and the Minuteman ICBM in the early 1960's most likely destroyed some prehistoric resources in the deployment area. Road construction caused greater impacts at stream crossings because of the extensive cutting and filling required to cross the deep stream channels in the region. When the 400 MS was constructed, they were excavated and backfilled with soil from the site and from off site. As part of the Peacekeeper program, surveys were conducted at the LFs and LF roads, and along the HICS path in 1983 and 1984 (F.E. Warren AFB, 2000). Field work conducted at the Peacekeeper LFs and LF roads included pedestrian surface reconnaissance of 25-foot-wide corridors around the perimeter of each LF, vehicle reconnaissance along access roads, and pedestrian surface inspection of rights-of-way that were relatively undisturbed by previous road construction. Ten prehistoric sites and nine isolated artifacts were identified and recorded as a consequence of reconnaissance associated with the LFs and LF access roads. Crews also

conducted archaeological reconnaissance within a 50 meter-wide corridor along portions of the Peacekeeper HICS path in response to some design changes. Sixteen prehistoric archaeological sites were found during the survey. The sites found included low-density lithic scatters and two temporary campsites. However, no prehistoric or historic archeological sites were identified on the LFs or MAFs.

3.9.2.2 Historic Buildings and Structures.

The Air Force has evaluated the Peacekeeper missile system for its eligibility for listing on the National Register. Eligibility criteria are properties that are 50 years old or under 50 years old and exceptionally important at a local, state, and/or national level. The Peacekeeper missile system is eligible for listing on the National Register because of its Cold War significance (F.E. Warren AFB, 2000). The Air Force has completed HAER documentation for the Peacekeeper missile system that is on file with the Wyoming SHPO (F.E. Warren AFB, 2001a, 2001b). A PA between the Air Force and Wyoming SHPO has been developed to document additional preservation measures (F.E. Warren AFB, 2013). Stipulations of the PA include:

- Preserve and maintain Building 486 (designated as Launch Facility Trainer U-02). U-02 shall be open to the public at regularly scheduled times as an interpretive display operated by the F.E. Warren Heritage and ICBM Museum Program. It shall also be open to the public during Fort D.A. Russell Days (the first weekend of Cheyenne Frontier Days) and by appointment in accordance with procedures established by the F.E. Warren ICBM and Heritage Museum.

- Provide to the Wyoming SHPO as-built drawings of the Peacekeeper LF and any other pertinent historic documentation.

- Retain ownership and responsibility for the preservation of the five (5) existing Peacekeeper MAFs until mitigation strategies for the disposition of these sites can be determined through an amendment of the PA. Possible future mitigations include transfer of MAF Q-01 to the State of Wyoming for use as a museum and interpretive facility.

- Complete a Historic Structures Report (HSR) for Q-01. The HSR shall be completed in accordance with the National Park Service's Preservation Brief 43: The Preparation and Use of Historic Structures Reports.

3.9.2.3 Traditional Cultural Resources.

There are no known traditional cultural resources at the LF or MAF locations. Because of site disturbance that occurred during their construction, it is unlikely that any culturally sensitive areas that would be subject to AIRFA or NAGPRA remain at the LF and MAF sites.

The Air Force has conducted consultations (letters of consultation sent on two occasions) with representatives of Native American groups as required under AIRFA. The purpose of these consultations was to determine AIRFA-related concerns such as access to sites of past cultural activity, landforms, and components of the natural environment which may occur at LF locations within the deployment area of the former 400 MS and are important to traditional religious practices of Native American groups. The Native American groups consulted include the Arapaho Tribe of the Wind River Reservation, Cheyenne and Arapaho Tribes of Oklahoma, Cheyenne River Sioux Tribe, Crow Creek Sioux Tribal Council, Fort Peck Assiniboine and Sioux Tribe, Lower Brule Sioux Tribal Council, Northern Cheyenne, Oglala Sioux Tribe, Rosebud Sioux Tribe, Santee Sioux Nation, and Standing Rock Sioux Tribe. The Native American groups contacted expressed no interest in the LF locations within the former 400 MS deployment area.

3.9.3 Vandenberg AFB

3.9.3.1 Prehistoric and Historic Archaeological Resources.

When the LFs were constructed, the sites were excavated and backfilled with soil from the immediate vicinity. However, the four LFs at Vandenberg AFB were constructed within or adjacent to archeological sites. The construction of LF-05 partially destroyed prehistoric archeological site CA-SBA-1853. The remains of the site have been evaluated and determined to be eligible for listing in the National Register through consultation with the California SHPO in June 1984. The construction of LF-06 impacted two prehistoric archeological sites (CA-SBA-2129 and CA-SBA-1866), located adjacent to the LF. National Register eligibility of both sites remains undetermined but are treated as though they are eligible. LF-07 was constructed within the boundaries of a known archeological site (CA-SBA-228). This site has not been evaluated for eligibility. LF-25 was not constructed within or adjacent to an archeological site. However, a known prehistoric archeological site (CA-SBA-3480) is located approximately 50 meters (165 feet) from the LF.

3.9.3.2 Historic Buildings and Structures.

LF-05 was constructed in 1961 as one of the first six Minuteman facilities on Vandenberg AFB. LF-05 is an example of an active “frontline” operational facility engaged in programs supporting defense-related missions (Vandenberg AFB, 1997a). In 1985, LF-05 was subsequently modified for use in the Peacekeeper program, with the Air Force ultimately deploying fifty Peacekeeper ICBMs at F.E. Warren AFB. In supporting operational Peacekeeper flight tests, LF-05 has directly supported operational missions of the Peacekeeper ICBM program during its design, development, and testing phases. Therefore, LF-05 is eligible on the National Register as a site under Cold War Criterion A (“directly associated with events that, are directly identified with, the broad national pattern of the United States Cold War history”) and Cold War Criterion D (“embody the distinguishing characteristics of an architectural, engineering, technological, or scientific type specimen exceptionally valuable for a study of a period, style, method, or

technique of construction, or that represents a significant, distinctive and exceptional entity whose components may lack individual distinction") (Vandenberg AFB, 1997a). Following the Peacekeeper mission, the Missile Defense Agency (MDA) proposed the reuse of LF-05 for a new non-Peacekeeper mission. Reconstruction and reuse of LF-05 by the Missile Defense Agency and the loss of a Peacekeeper facility was considered an adverse effect. Therefore, HAER recordation of LF-05 was required by the California SHPO. At the time, LF-05 was inaccessible for such activities; therefore, a HAER was completed for LF-02 (additional Peacekeeper LF) in 2004.

LF-06 was also constructed in 1961 as one of the first six Minuteman facilities on Vandenberg AFB. Although significantly modified from its original configuration, LF-06 has supported operational missions of exceptionally important research and development programs since 1969 (Vandenberg AFB, 1997a). Therefore, LF-06 is considered eligible for listing on the National Register as a site under Cold War Criterion A.

LF-07 (not included in New START) was constructed in 1962 also as one of the first six Minuteman facilities on Vandenberg AFB and is also eligible for listing on the National Register as a site under Cold War Criterion A. In 1997, the Air Force decommissioned LF-07. This action was considered a project that required consultation with the California SHPO. Following consultation, it was concluded that decommissioning LF-07 was not considered an adverse effect because no demolition activities were taking place at the time, and adequate documentation existed for Minuteman launch facilities and MAFs.

LF-25 was constructed in 1964 also as one of the first six Minuteman facilities on Vandenberg AFB. Between 1965 and 1976, LF-25 directly contributed to the Minuteman ICBM program by supporting numerous operational Minuteman test flights. After the last launch in 1976, the Air Force abandoned and stripped LF-25 of useful equipment. Consequently, LF-25 no longer retains sufficient physical integrity to adequately convey a sense of its historic function. Therefore, LF-25 does not meet the National Register integrity requirement and is not eligible for listing on the National Register (Vandenberg AFB, 1997a).

Vandenberg AFB currently maintains a PA for management of historic Cold War resources. The purpose of the PA is to streamline management activities for Vandenberg AFB historic Cold War properties including refurbishment of the LFs after launch activities.

An MOA between the Air Force and California SHPO has been developed to document the accepted additional efforts that would resolve the adverse effects of the dismantlement action (Vandenberg AFB, 2013). Additional efforts will include 1) preparation of California Department of Parks and Recreation (DPR) 523 forms for LF-05, LF-06, and LF-07 based on existing architectural and engineering descriptions of the facilities, available plans, diagrams, and drawings. This recordation effort would include photographic documentation of the three LFs prior to demolition and photos of the demolition process using high-

resolution digital cameras, and 2) preparation of a brochure based on the DPR summary forms, photography, and other applicable information.

3.9.3.3 Traditional Cultural Resources.

As discussed previously, the LFs are within or adjacent to known archaeological sites. The Air Force has conducted consultation with representatives of the Santa Ynez Band of the Chumash Indians as required under AIRFA. The purpose of this consultation was to determine AIRFA-related concerns such as access to sites of past cultural activity, landforms, and components of the natural environment which may occur at the LF locations on Vandenberg AFB and are important to traditional religious practices. The Chumash expressed no concern regarding the dismantlement of the LFs; however, based on the presence of known archaeological sites in the vicinity of the LFs, and per standard monitoring procedures, the Chumash requested a Native American monitor be present during ground disturbing activities (see Appendix C).

3.10 ENVIRONMENTAL JUSTICE

EO 12898, Environmental Justice, was issued by the President on February 11, 1994. Objectives of the EO, as it pertains to this EA, include development of federal agency implementation strategies and identification of low-income and minority populations potentially affected because of proposed federal actions. Accompanying EO 12898 was a Presidential Transmittal Memorandum referencing existing Federal statutes and regulations to be used in conjunction with EO 12898. One of the items in this memorandum was the use of the policies and procedures of NEPA. Specifically, the memorandum indicates that,

"Each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 U.S.C. section 4321 et. seq."

In addition to environmental justice issues are concerns pursuant to EO 13045, Protection of Children from Environmental Health Risks and Safety Risks. This EO directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

3.10.1 Malmstrom AFB

The Community of Comparison (COC), or ROI, for the environmental justice analysis is defined as the four counties within the former 564 MS (Chouteau, Pondera, Teton, and Toole counties) where dismantlement activities would occur.

3.10.1.1 Demographic Profile.

Although EO 12898 provides no guidelines for determination of concentrations of low-income or minority populations, the demographic analysis provides information on the approximate locations of minority and low-income populations

in the area potentially affected by the proposed federal action. Potential environmental impacts from the Proposed Action and No-Action Alternative would occur within the 4-county area where the former 564 MS is situated.

Demographic information from the U.S. Bureau of the Census was used to extract data on minority, low-income, and child populations within Montana and each of the four counties within the former 564 MS area. The census reports both ethnicity and household income status. Minority populations included in the census are identified as Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, or some other race. Information on minority populations based on the 2010 Census of Population and Housing is presented in Table 3.11-1 and shown on Figure 3.11-1. Only Chouteau and Pondera counties, with 24.2 percent and 17.3 percent minority populations, respectively, have a minority population percentage higher than the state average of 10.6 percent. In both counties, persons identified as American Indian and Alaska Native account for most of the minority population at 14.6 percent and 14.4 percent of the population of Chouteau and Pondera counties, respectively. A portion of the Rocky Boy's Indian Reservation is situated within Chouteau County and a portion of the Blackfeet Indian Reservation is situated within Pondera County. No LFs or MAFs are situated within the Blackfeet or Rocky Boy's Indian reservations.

Table 3.11-1. Percent Minority and Low-Income Populations within Former 564 MS Counties

	Population	Percent Minority	Disproportionately High	Percent of Population Below Poverty Level	Disproportionately High
United States		27.6		14.3	
Montana	**989,415**	**10.6**		**15.0**	
Chouteau	5,813	24.2	Yes	18.1	Yes
Pondera	6,153	17.3	Yes	19.1	Yes
Teton	6,073	3.7	No	15.3	Yes
Toole	5,324	8.0	No	16.5	Yes

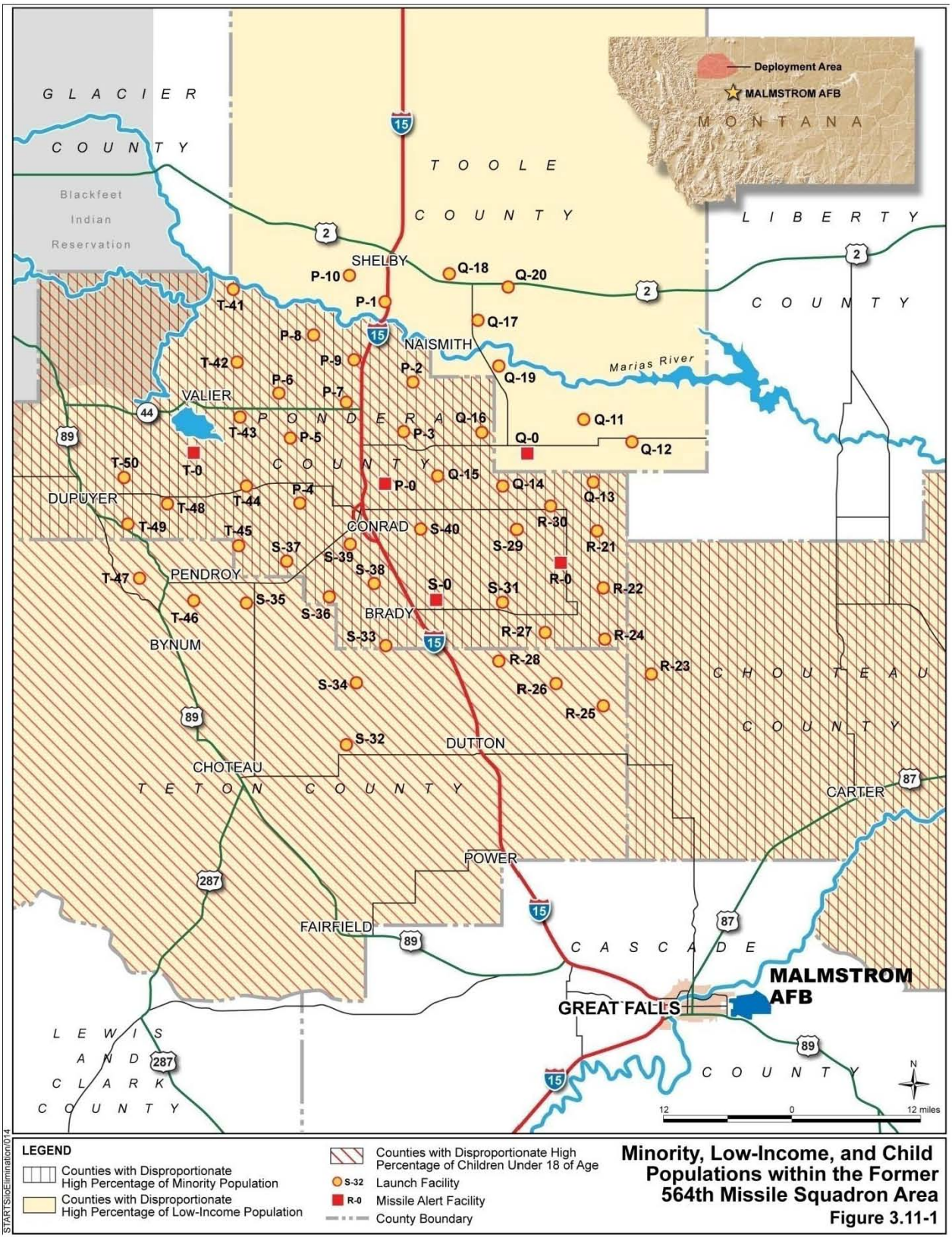
Source: U.S. Census Bureau, 2010a-e.

U.S. Census Bureau poverty status is used in this EA to define low-income status. Poverty status is reported for families with income below poverty level (defined in the 2010 census as $22,350 for a family of four with two children under the age of 18 in 2009). The four counties wholly or partially within the former 564 MS (Chouteau, Pondera, Teton, and Toole counties) have a percent low-income population higher than the state average of 15.0 percent (see Table 3.11-1 and Figure 3.11-1).

Child populations, for consideration of EO 13045, is defined as persons under the age of 18. Based on the 2010 Census of Population and Housing, three of the four counties (Chouteau, Pondera, and Teton counties) within the former 564 MS area have a percentage of persons under 18 years of age that is higher than the state average of 22.6 percent (Table 3.11-2 and Figure 3.11-1).

3.10.2 F.E. Warren AFB

The ROI, for the environmental justice analysis is defined as the three counties within the former 400 MS (Goshen, Laramie, and Platte counties) where dismantlement activities would occur.



Minority, Low-Income, and Child Populations within the Former 564th Missile Squadron Area

Figure 3.11-1

Table 3.11-2. Percent Persons Under 18 Years of Age within Former 564 MS Counties

	Percent Under Age 18	Disproportionately High
United States	24.0	
Montana	**22.6**	
Chouteau	26.7	Yes
Pondera	25.0	Yes
Teton	23.3	Yes
Toole	20.7	No

Source: U.S. Census Bureau, 2010a-e.

3.10.2.1 Demographic Profile.

Demographic information from the U.S. Bureau of the Census was used to extract data on minority, low-income, and child populations within Wyoming and each of the three counties within the former 400 MS area. The census reports both ethnicity and household income status. Information on minority populations based on the 2010 Census of Population and Housing is presented in Table 3.11-3 and shown in Figure 3.11-2. Only Laramie County, with 11.5 percent minority population, has a minority population percentage higher than the state average of 9.3 percent. Hispanic or latino accounted for most of the minority population at 13.1 percent of the population of Laramie County.

Table 3.11-3. Percent Minority and Low-Income Populations within Former 400 MS Counties

	Population	Percent Minority	Disproportionately High	Percent of Population Below Poverty Level	Disproportionately High
United States		27.6		14.3	
Wyoming	**563,626**	**9.3**		**10.2**	
Goshen	13,249	5.5	No	14.3	Yes
Laramie	91,738	11.5	Yes	10.4	Yes
Platte	8,667	4.6	No	12.6	Yes

Source: U.S. Census Bureau, 2010f-i.

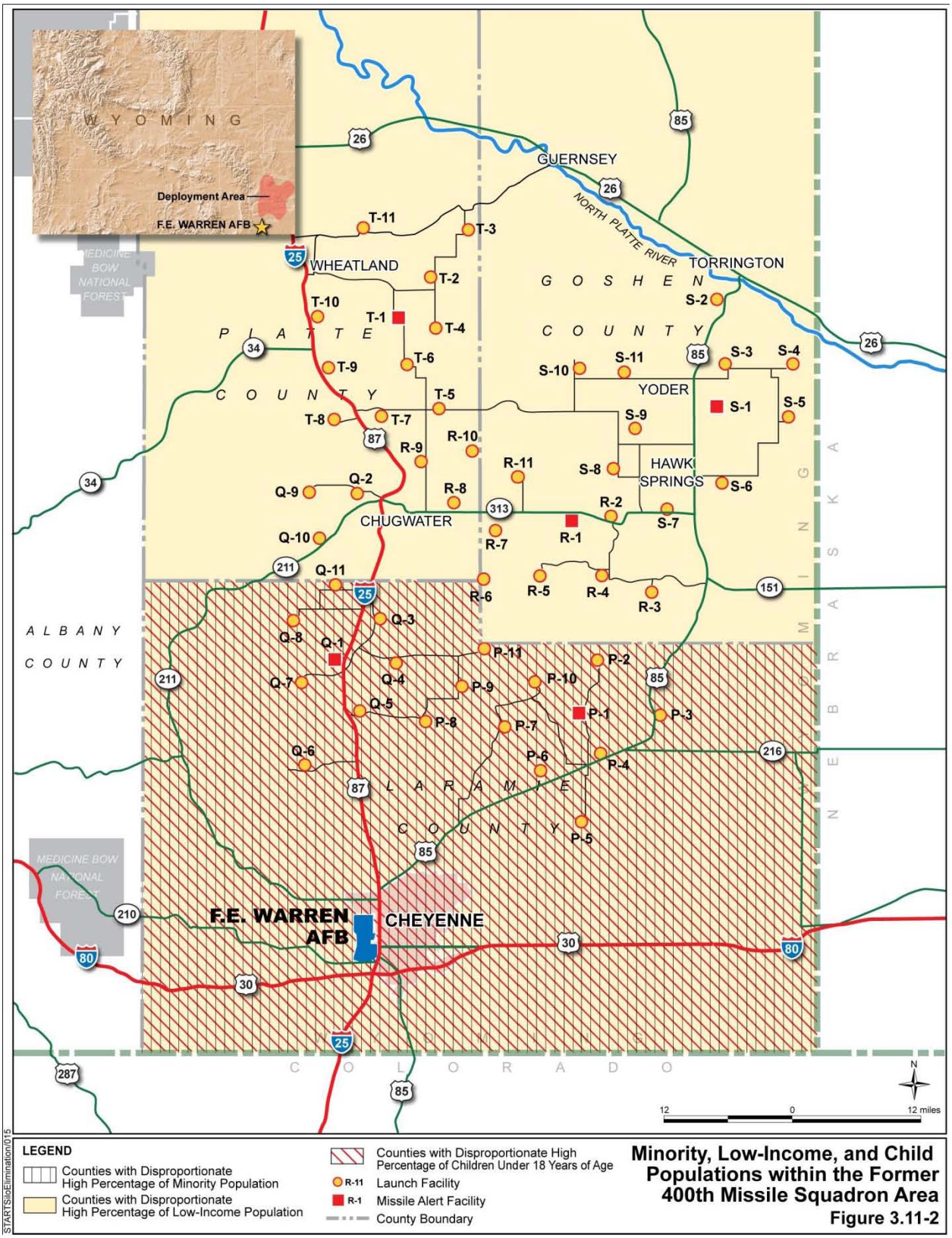
The three counties wholly or partially within the former 400 MS area (Goshen, Laramie, and Platte counties) have a percent low-income population higher than the state average of 10.2 percent (see Table 3.11-3 and Figure 3.11-2).

Based on the 2010 Census of Population and Housing, only Laramie County has a percentage of persons under 18 years of age that is higher than the state average of 24.0 percent (Table 3.11-4 and Figure 3.11-2).

Table 3.11-4. Percent Persons Under 18 Years of Age within Former 400 MS Counties

	Percent Under Age 18	Disproportionately High
United States	24.0	
Wyoming	**24.0**	
Goshen	20.4	No
Laramie	24.4	Yes
Platte	20.4	No

Source: U.S. Census Bureau, 2010f-i.



Minority, Low-Income, and Child Populations within the Former 400th Missile Squadron Area

Figure 3.11-2

3.10.3 Vandenberg AFB

The ROI, for the environmental justice analysis is defined as Santa Barbara County within which the four LFs to be dismantled are situated.

3.10.3.1 Demographic Profile.

Demographic information from the U.S. Bureau of the Census was used to extract data on minority, low-income, and child populations within California and Santa Barbara County. The census reports both ethnicity and household income status. Information on minority populations based on the 2010 Census of Population and Housing is presented in Table 3.11-5. Santa Barbara County does not have a minority population higher than the state average.

Table 3.11-5. Percent Minority and Low-Income Populations in Santa Barbara County

	Population	Percent Minority	Disproportionately High	Percent of Population Below Poverty Level	Disproportionately High
United States		27.6		14.3	
California	**37,253,956**	**42.4**		**14.2**	
Santa Barbara	423,895	30.4	No	15.0	Yes

Source: U.S. Census Bureau, 2010j, k.

Santa Barbara County has a percent low-income population (15 percent) higher than the state average of 14.2 percent (see Table 3.11-5).

Based on the 2010 Census of Population and Housing, Santa Barbara County does not have a percentage of persons under 18 years of age that is higher than the state average of 25.0 percent (Table 3.11-6).

Table 3.11-6. Percent Persons Under 18 Years of Age in Santa Barbara County

	Percent Under Age 18	Disproportionately High
United States	24.0	
California	**25.0**	
Santa Barbara	23.1	No

Source: U.S. Census Bureau, 2010j, k.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter presents the results of the analysis of potential environmental effects from dismantlement of 50 Minuteman III LFs and five MAFs assigned to Malmstrom AFB, Montana; 50 Peacekeeper LFs and five MAFs assigned to F.E. Warren AFB, Wyoming; and three Minuteman III and one Peacekeeper test LFs at Vandenberg AFB, California. The Proposed Action (Explosive Implosion Alternative and Backfill Alternative) and No-Action Alternative are analyzed. Changes to the natural and human environments that may result from the Proposed Action and No-Action Alternative were evaluated relative to the existing environment as described in Chapter 3.0. The potential for significant environmental consequences was evaluated utilizing the context and intensity considerations as defined in CEQ regulations for implementing the procedural provisions of NEPA (40 CFR Part 1508.27).

4.2 LAND USE AND AESTHETICS

The potential effects of the alternative dismantlement options for silo dismantlement and No-Action Alternative on land use and aesthetics within the ROI are presented in this section.

4.2.1 Malmstrom AFB

4.2.1.1 Explosive Implosion Alternative.

Land Use. Under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of no less than six meters (20 feet). The silo would be completely filled with the resulting debris and earth or gravel. In addition to the implosion of the LF, the LFSB would also be dismantled and filled with earth or gravel. Following dismantlement activities, and after the 60-day observation/verification period, the LF sites would be graded to meld with existing site contours and existing security fencing would remain in place.

During dismantlement activities at MAF locations, access to the LCC and the LCEB would be sealed off. The surface buildings at the MAF would not be demolished, but would be left as a part of the real property.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). No ground disturbance would occur and the property would continue to be compatible with surrounding land uses.

Following dismantlement and grading activities at LF and MAF locations, real estate interests at these sites would be terminated. The disposal process is covered in P.L. 100-108, Section 235 (10 U.S.C. Section 9781).

Future use of the LF and MAF property is speculative and is beyond the scope of analysis in this EA. However, after site grading activities are completed, the LF and MAF property would continue to be compatible with surrounding land uses; therefore, no significant impacts to land use are anticipated.

Aesthetics. The restoration of the LFs (grading of the site) and MAFs (surface structures would remain) would not change the visual character of the area; therefore, significant degradation of the existing aesthetic quality is not anticipated.

4.2.1.2 Backfill Alternative.

Under the Backfill Alternative, the silo door would be removed, dismantled, or destroyed and the silo would be completely filled with the resulting debris and earth or gravel. In addition to backfilling the LF, the LFSB would also be dismantled and filled with earth or gravel. Following dismantlement activities, and after the 60-day observation/verification period, the LF sites would be graded to meld with existing contours and existing security fencing would remain in place.

During dismantlement activities at MAF locations, access to the LCC and the LCEB would be sealed off. The surface buildings at the MAF would not be demolished, but would be left as a part of the real property.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). No ground disturbance would occur and the property would continue to be compatible with surrounding land uses.

Following dismantlement and grading activities at LF and MAF locations, real estate interests at these sites would be terminated. The disposal process is covered in P.L. 100-108, Section 235 (10 U.S.C. Section 9781).

Future use of the LF and MAF property is speculative and is beyond the scope of analysis in this EA. However, after site grading activities are completed, the LF and MAF property would continue to be compatible with surrounding land uses; therefore, no significant impacts to land use are anticipated.

Aesthetics. The restoration of the LFs (grading of the site) and MAFs (surface structures would remain) would not change the visual character of the area; therefore, significant degradation of the existing aesthetic quality is not anticipated.

4.2.1.3 No-Action Alternative.

Land Use. Under the No-Action Alternative, no dismantlement activities would occur. The LFs and MAFs of the former 564 MS would be retained by the Air Force and would continue to be maintained in caretaker status. The LF and MAF property would continue to be compatible with surrounding land uses; therefore, no significant impacts to land use are anticipated.

Aesthetics. The LFs and MAFs of the former 564 MS would be maintained in caretaker status. Vegetation maintenance would continue to occur to ensure the visual character of the LFs and MAFs does not change; therefore, significant degradation of the existing aesthetic quality is not anticipated.

Mitigation Measures

Because no significant impacts to land use and aesthetics have been identified, no mitigation measures would be required.

4.2.2 F.E. Warren AFB

4.2.2.1 Explosive Implosion Alternative.

Potential impacts to land use and aesthetics would be the same as those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.2.1.1). No significant impacts are anticipated.

4.2.2.2 Backfill Alternative.

Potential impacts to land use and aesthetics would be the same as those discussed under the Malmstrom AFB Backfill Alternative (see Section 4.2.1.2). No significant impacts are anticipated.

4.2.2.3 No-Action Alternative.

Potential impacts to land use and aesthetics would be the same as those discussed under the Malmstrom AFB No-Action Alternative (see Section 4.2.1.3). No significant impacts are anticipated.

Mitigation Measures

Because no significant impacts to land use and aesthetics have been identified, no mitigation measures would be required.

4.2.3 Vandenberg AFB

4.2.3.1 Explosive Implosion Alternative.

Land Use. Activities under the Explosive Implosion Alternative would be similar to those described for Malmstrom AFB and F.E. Warren AFB. However, at Vandenberg AFB, the dismantlement effort at LF-06 and LF-25 would also include support facility demolition. Due to the location of a support structure near each of these LFs, these structures would require demolition prior to initiating explosive implosion of the silos. Vandenberg AFB maintains a program where facilities that are scheduled for demolition are deconstructed with most of the materials either being reused or recycled, minimizing the amount of debris that is disposed in a landfill. Following dismantlement activities, and after the 60-day observation/verification period, the LF sites would be repaved to meld with existing site pavement and existing security fencing would remain in place.

Future Air Force use of the LF property is speculative and is beyond the scope of analysis in this EA. However, after site grading activities are completed, the LF property would continue to be compatible with surrounding land uses; therefore, no significant impacts to land use are anticipated.

Aesthetics. The restoration of the LFs (paving of the site) would not change the visual character of the area and removal of the structures at LF-06 and LF-25 would improve the visual quality of the area; therefore, significant degradation of the existing aesthetic quality is not anticipated.

4.2.3.2 Backfill Alternative.

Land Use. Dismantlement activities under the Backfill Alternative would be similar to those described under the Explosive Implosion Alternative. However, because no explosive implosion would occur, the support structures near LF-06 and LF-25 would not require demolition.

Future Air Force use of the LF property is speculative and is beyond the scope of analysis in this EA. However, after site grading activities are completed, the LF property would continue to be compatible with surrounding land uses; therefore, no significant impacts to land use are anticipated.

Aesthetics. The restoration of the LFs (paving of the site) would not change the visual character of the area and the support structures near LF-06 and LF-25 would remain; therefore, significant degradation of the existing aesthetic quality is not anticipated.

4.2.3.3 No-Action Alternative.

Land Use. Under the No-Action Alternative, no dismantlement activities would occur. The LFs and associated support structures would continue to be maintained in caretaker status. The LF property would continue to be compatible with surrounding land uses; therefore, no significant impacts to land use are anticipated.

Aesthetics. The LFs and associated support structures would continue to be maintained in caretaker status. Vegetation maintenance would continue to occur to ensure the visual character of the LFs does not change; therefore, significant degradation of the existing aesthetic quality is not anticipated.

Mitigation Measures

Because no significant impacts to land use and aesthetics have been identified, no mitigation measures would be required.

4.3 HAZARDOUS MATERIALS AND HAZARDOUS WASTE MANAGEMENT

This section addresses the potential impacts of hazardous materials and hazardous waste management activities associated with implementation of

dismantlement activities. Hazardous materials management, hazardous waste management, asbestos, LBP, PCBs, and ordnance are discussed in this section.

4.3.1 Malmstrom AFB

4.3.1.1 Hazardous Materials Management

4.3.1.1.1 Explosive Implosion Alternative.

Hazardous materials utilized at LF and MAF facilities (i.e., POL, fuels; ethylene glycol; sodium chromate; lead-acid batteries) have been removed as part of 564 MS deactivation activities in 2007. No hazardous materials were associated with the buried HICS cable. During dismantlement activities, small amounts of hazardous materials are expected to be utilized, and the potential for spills would exist. Any spills or releases of hazardous materials would be cleaned up by the dismantlement contractor. Hazardous materials likely to be utilized during dismantlement activities include motor fuels; solvents; POL, and household products. Storage, handling, and transportation of hazardous materials associated with dismantlement activities would be conducted in accordance with applicable regulations and established procedures. Only required hazardous materials would be used/stored in appropriate containers with adequate spill containment/protection. Because hazardous materials would be managed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.1.1.2 Backfill Alternative.

Management of hazardous materials would be similar to that described under the Explosive Implosion Alternative. The types and quantities of hazardous materials expected to be used during dismantlement activities are anticipated to be similar to that discussed under the Explosive Implosion Alternative. Storage, handling, and transportation of hazardous materials associated with dismantlement activities would be conducted in accordance with applicable regulations and established procedures. Only required hazardous materials would be used/stored in appropriate containers with adequate spill containment/protection. Because hazardous materials would be managed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.1.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs and MAFs of the former 564 MS would be retained by the Air Force and would continue to be maintained in caretaker status. Because hazardous materials are no longer used or stored at the LFs and MAFs, no significant impacts are anticipated.

4.3.1.2 Hazardous Waste Management

4.3.1.2.1 Explosive Implosion Alternative.

Due to the deactivation of the 564 MS, hazardous wastes are not generated at the LFs or MAFs. However, small quantities of hazardous waste may be generated during dismantlement activities. The Air Force would ensure that the contractor follows applicable regulations for management of any hazardous waste generated and cleans up any spills or releases of fuel or oil from equipment. The Air Force would also ensure that the contractor disposes any hazardous waste generated on the property in accordance with applicable regulations at an approved off-site location. Any hazardous waste generated would be stored in appropriate containers with adequate spill containment/protection. Because hazardous waste would be managed and disposed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.1.2.2 Backfill Alternative.

Management of hazardous wastes would be similar to that described under the Explosive Implosion Alternative. The types and quantities of hazardous waste expected to be generated during dismantlement activities are anticipated to be similar to that discussed under the Explosive Implosion Alternative. Any hazardous waste generated would be stored in appropriate containers with adequate spill containment/protection. Because the Air Force would ensure that the contractor manages and disposes any hazardous waste generated in accordance with applicable regulations, no significant impacts are anticipated.

4.3.1.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs and MAFs of the former 564 MS would be retained by the Air Force and would continue to be maintained in caretaker status. Because hazardous waste is no longer used or stored at the LFs and MAFs, no significant impacts are anticipated.

4.3.1.3 Environmental Restoration Program Sites

4.3.1.3.1 Explosive Implosion Alternative.

Five ERP sites are associated with the former 564 MS. ERP/Release Site 1331 at LF Q-15 and ERP/Release Site 3434 at LF Q-18 both involved diesel fuel surface spills and have been closed. ERP/Release Site 2662, located at MAF P-0 and ERP/Release Sites 1089 and 2137, located at MAF S-0, remain active. Based on the closure of the ERP/Release Sites at LF Q-15 and LF Q-18, and because the Air Force would continue remediation and monitoring activities at MAF P-0 and MAF S-0 until cleared for disposal, no significant impacts are anticipated to remediation activities.

4.3.1.3.2 Backfill Alternative.

Potential impacts to/from remediation activities under this alternative would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.1.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs and MAFs of the former 564 MS would be retained by the Air Force and would continue to be maintained in caretaker status. No significant impacts to the environment are anticipated.

4.3.1.4 Asbestos

4.3.1.4.1 Explosive Implosion Alternative.

Workers conducting dismantlement activities would be advised, to the extent known, of the type, condition, and amount of ACM present at the LFs and MAFs. Dismantlement activities would be subject to applicable federal, state, and local regulations to minimize the potential risk to human health and the environment. Any ACM waste generated as a result of dismantlement activities would be disposed off-site in accordance with applicable regulations. Management of ACM and ACM waste in accordance with applicable regulations would preclude significant impacts.

4.3.1.4.2 Backfill Alternative.

Potential impacts from ACM would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.1.4.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of ACM within the LFs and MAFs. The Air Force would continue to manage ACM in accordance with current Air Force policy and applicable regulations. Management of ACM in accordance with applicable regulations would preclude significant impacts.

4.3.1.5 Lead-Based Paint

4.3.1.5.1 Explosive Implosion Alternative.

LBP would likely be encountered during dismantlement activities. Workers conducting dismantlement activities would be advised, to the extent known, of the type, condition, and amount of LBP present at the LFs and MAFs. Dismantlement activities would be subject to applicable federal, state, and local regulations to minimize the potential risk to human health and the environment. Any LBP waste generated as a result of dismantlement activities would be disposed off-site in accordance with applicable regulations. Management of LBP

and LBP waste in accordance with applicable regulations would preclude significant impacts.

4.3.1.5.2 Backfill Alternative.

Potential impacts from LBP would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.1.5.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of LBP within the LFs and MAFs. The Air Force would continue to manage LBP in accordance with current Air Force policy and applicable regulations. Management of LBP in accordance with applicable regulations would preclude significant impacts.

4.3.1.6 Polychlorinated Biphenyls

4.3.1.6.1 Explosive Implosion Alternative.

Equipment containing PCBs has been removed from the LFs and MAFs. PCBs were not associated with the buried HICS cable. However, a weather sealing coating may be present on the exterior concrete of the LFSB that contains solid PCB material. The USTs at the LF sites contained a coating that included a similar PCB material. The solid PCB coating on the UST at the LF sites was sampled and analyzed, with results below laboratory reporting limits. TCLP analysis indicated that the PCB material was not leachable. Because the USTs were installed at the same time that the LFSBs were constructed, the coating used on the USTs is likely the same coating used on the exterior of the buried LFSB; therefore, the PCB concentration of the coating would likely also be below reporting limits. During a 5-years groundwater monitoring effort that focused on potential PCB contamination at dismantled LFs associated with Whiteman AFB (which contained solid PCB coatings), PCBs were not detected above laboratory reporting limits, further confirming that the solid PCB material is not leachable (U.S. Geological Survey, 2002).

Workers involved in the demolition would be notified of the potential presence of PCBs. If any PCB-contaminated items are identified during the dismantlement process, the Air Force would require proper safety protocols for site workers. Management of PCBs in accordance with applicable regulations would preclude significant impacts.

4.3.1.6.2 Backfill Alternative.

Potential impacts from PCBs would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.1.6.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of PCBs within the LFs and MAFs. The Air Force would continue to manage PCBs in accordance with current Air Force policy and applicable regulations. Management of PCBs in accordance with applicable regulations would preclude significant impacts.

4.3.1.7 Ordnance

4.3.1.7.1 Explosive Implosion Alternative.

Missile components, including the RV, PSRE, booster, and launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs were removed from the LFs and MAFs in 2007 during deactivation activities. However, under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). Concentric holes would be drilled vertically in the concrete of the headworks for the placement of explosives. To limit environmental impacts, the dismantlement design would specify limits on explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The demolition contractor would be required to use the minimum amount of explosives necessary to implode the concrete and steel into the launch tube. The explosive implosion of each LF would be designed to prevent the ejection of large pieces of debris outward from the launch tube (e.g., use of blast mats). The dismantlement contractor would also prepare and implement a blasting and safety plan and blasting activities would be supervised and performed by qualified individuals experienced in demolition blasting. Therefore, no significant impacts are anticipated.

4.3.1.7.2 Backfill Alternative.

Missile components, including the RV, PSRE, booster, and launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs were removed from the LFs and MAFs in 2007 during deactivation activities. No explosive implosion would occur under this alternative; therefore, no significant impacts are anticipated.

4.3.1.7.3 No-Action Alternative.

Under the No-Action Alternative, no dismantlement activities would occur. The LFs and MAFs of the former 564 MS would be retained by the Air Force and would continue to be maintained in caretaker status. No significant impacts from ordnance/explosive components are anticipated.

Mitigation Measures

Because no significant impacts to hazardous materials and hazardous waste management, ERP sites, ACM, LBP, PCBs, or ordnance have been identified, no mitigation measures would be required.

4.3.2 F.E. Warren AFB

4.3.2.1 Hazardous Materials Management

4.3.2.1.1 Explosive Implosion Alternative.

Hazardous materials utilized at LF and MAF facilities have been removed as part of 400 MS deactivation activities in 2005. No hazardous materials were associated with the buried HICS cable. During dismantlement activities, small amounts of hazardous materials are expected to be utilized, and the potential for spills would exist. Any spills or releases of hazardous materials would be cleaned up by the contractor. Hazardous materials likely to be utilized during dismantlement activities include motor fuels; solvents; POL, and household products. Storage, handling, and transportation of hazardous materials associated with dismantlement activities would be conducted in accordance with applicable regulations and established procedures. Only required hazardous materials would be used/stored in appropriate containers with adequate spill containment/protection. Because hazardous materials would be managed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.2.1.2 Backfill Alternative.

Management of hazardous materials would be similar to that described under the Explosive Implosion Alternative. Only required hazardous materials would be used/stored in appropriate containers with adequate spill containment/protection. Because hazardous materials would be managed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.2.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs and MAFs of the former 400 MS would be retained by the Air Force and would continue to be maintained in caretaker status. Because hazardous materials are no longer used or stored at the LFs and MAFs, no significant impacts to the environment are anticipated.

4.3.2.2 Hazardous Waste Management

4.3.2.2.1 Explosive Implosion Alternative.

Due to the deactivation of the 400 MS, hazardous wastes are not generated at the LFs or MAFs. However, small quantities of hazardous waste may be generated during dismantlement activities. The Air Force would ensure that the contractor follows applicable regulations for management of any hazardous

waste generated and cleans up any spills or releases of fuel or oil from equipment. The Air Force would also ensure that the contractor disposes any hazardous waste generated on the property in accordance with applicable regulations at an approved off-site location. Any hazardous waste generated would be stored in appropriate containers with adequate spill containment/ protection. Because hazardous waste would be managed and disposed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.2.2.2 Backfill Alternative.

Management of hazardous wastes would be similar to that described under the Explosive Implosion Alternative. The types and quantities of hazardous waste expected to be generated during dismantlement activities are anticipated to be similar to that discussed under the Explosive Implosion Alternative. Any hazardous waste generated would be stored in appropriate containers with adequate spill containment/protection. Because the Air Force would ensure that the contractor manages and disposes any hazardous waste generated in accordance with applicable regulations, no significant impacts are anticipated.

4.3.2.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs and MAFs of the former 400 MS would be retained by the Air Force and would continue to be maintained in caretaker status. Because hazardous waste is no longer used or stored at the LFs and MAFs, no significant impacts to the environment are anticipated.

4.3.2.3 Environmental Restoration Program Sites

4.3.2.3.1 Explosive Implosion Alternative.

No ERP sites are associated with LFs and MAFs within the former 400 MS. Therefore, no impacts are anticipated to remediation activities.

4.3.2.3.2 Backfill Alternative.

No ERP sites are associated with LFs and MAFs within the former 400 MS. Therefore, no impacts are anticipated to remediation activities.

4.3.2.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs and MAFs of the former 400 MS would be retained by the Air Force and would continue to be maintained in caretaker status. No significant impacts are anticipated.

4.3.2.4 Asbestos

4.3.2.4.1 Explosive Implosion Alternative.

Facilities at the LFs of the former 400 MS have been surveyed and are asbestos-free. Previous renovation activities at the MAFs have removed asbestos with the exception of ACM in the ceiling ductwork and in the insulation around some pipes above the false ceiling of the LCSB. There is no ACM in the air ducts of the MAFs. ACM remaining at the MAFs include transite siding on the walls of each MAF garage furnace room. Workers conducting dismantlement activities would be advised of the type, condition, and amount of ACM present at the MAFs. Dismantlement activities would be subject to applicable federal, state, and local regulations to minimize the potential risk to human health and the environment. Any ACM waste generated as a result of dismantlement activities would be disposed off-site in accordance with applicable regulations. Management of ACM and ACM waste in accordance with applicable regulations would preclude significant impacts.

4.3.2.4.2 Backfill Alternative.

Potential impacts from ACM would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.2.4.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of ACM within the LFs and MAFs. The Air Force would continue to manage ACM in accordance with current Air Force policy and applicable regulations. Management of ACM in accordance with applicable regulations would preclude significant impacts.

4.3.2.5 Lead-Based Paint

4.3.2.5.1 Explosive Implosion Alternative.

Due to the age of the LFs and MAFs, LBP would likely be encountered during dismantlement activities. Workers conducting dismantlement activities would be advised, to the extent known, of the type, condition, and amount of LBP present at the LFs and MAFs. Dismantlement activities would be subject to applicable federal, state, and local regulations to minimize the potential risk to human health and the environment. Any LBP waste generated as a result of dismantlement activities would be disposed off-site in accordance with applicable regulations. Management of LBP and LBP paint waste in accordance with applicable regulations would preclude significant impacts.

4.3.2.5.2 Backfill Alternative.

Potential impacts from LBP would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.2.5.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of LBP within the LFs and MAFs. The Air Force would continue to manage LBP in accordance with current Air Force policy and applicable regulations. Appropriate management of LBP in accordance with applicable regulations would preclude significant impacts.

4.3.2.6 Polychlorinated Biphenyls

4.3.2.6.1 Explosive Implosion Alternative.

Equipment containing PCBs has been removed from the LFs and MAFs. PCBs were not associated with the buried HICS cable. However, a weather sealing coating may be present on the exterior concrete of the LFSB of the former 400 MS that contain solid PCB material. The USTs at the LF sites contained a coating that included a similar PCB material. The solid PCB coating on the UST at the LF sites was sampled and analyzed, with results below laboratory reporting limits. TCLP analysis indicated that the PCB material was not leachable. Because the USTs were installed at the same time that the LFSBs were constructed, the coating used on the USTs is likely the same coating used on the exterior of the buried LFSB; therefore, the PCB concentration of the coating would likely also be below reporting limits. During a 5-years groundwater monitoring effort that focused on potential PCB contamination at dismantled LFs associated with Whiteman AFB (which contained solid PCB coatings), PCBs were not detected above laboratory reporting limits, further confirming that the solid PCB material is not leachable (U.S. Geological Survey, 2002).

Workers involved in the demolition would be notified of the potential presence of PCBs. If any PCB-contaminated items are identified during the dismantlement process, the Air Force would require proper safety protocols for site workers. Management of PCBs in accordance with applicable regulations would preclude significant impacts.

4.3.2.6.2 Backfill Alternative.

Potential impacts from PCBs would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.2.6.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of PCBs within the LFs and MAFs. The Air Force would continue to manage PCBs in accordance with current Air Force policy and applicable regulations. Management of PCBs in accordance with applicable regulations would preclude significant impacts.

4.3.2.7 Ordnance

4.3.2.7.1 Explosive Implosion Alternative.

Missile components, including the RV, PSRE, booster, and launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs were removed from the LFs and MAFs in 2005 during deactivation activities. However, under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). Concentric holes would be drilled vertically in the concrete of the headworks for the placement of explosives. To limit environmental impacts, the dismantlement design would specify limits on explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The demolition contractor would be required to use the minimum amount of explosives necessary to implode the concrete and steel into the launch tube. The explosive implosion of each LF would be designed to prevent the ejection of large pieces of debris outward from the launch tube (e.g., use of blast mats). The dismantlement contractor would also prepare and implement a blasting and safety plan and blasting activities would be supervised and performed by qualified individuals experienced in demolition blasting. Therefore, no significant impacts are anticipated.

4.3.2.7.2 Backfill Alternative.

Missile components, including the RV, PSRE, booster, and launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs were removed from the LFs and MAFs in 2005 during deactivation activities. No explosive implosion would occur under this alternative; therefore, no significant impacts are anticipated.

4.3.2.7.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs and MAFs of the former 400 MS would be retained by the Air Force and would continue to be maintained in caretaker status. No significant impacts from ordnance/explosive components are anticipated.

Mitigation Measures

Because no significant impacts to hazardous materials and hazardous waste management, ERP sites, ACM, LBP, PCBs, or ordnance have been identified, no mitigation measures would be required.

4.3.3 Vandenberg AFB

4.3.3.1 Hazardous Materials Management

4.3.3.1.1 Explosive Implosion Alternative.

Hazardous materials and equipment within the LFs (e.g., fuels, oil, hydraulic fluid, sodium chromate, etc.) have been drained and removed. During dismantlement activities, small amounts of hazardous materials are expected to be utilized, and the potential for spills would exist. Any spills or releases of hazardous materials would be cleaned up by the contractor. Hazardous materials likely to be utilized during dismantlement activities include motor fuels; solvents; POL, and household products. Storage, handling, and transportation of hazardous materials associated with dismantlement activities would be conducted in accordance with applicable regulations and established procedures. Only required hazardous materials would be used/stored in appropriate containers with adequate spill containment/protection. Because hazardous materials would be managed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.3.1.2 Backfill Alternative.

Management of hazardous materials would be similar to that described under the Explosive Implosion Alternative. Only required hazardous materials would be used/stored in appropriate containers with adequate spill containment/protection. Because hazardous materials would be managed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.3.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs would continue to be maintained in caretaker status. Because hazardous materials are no longer used or stored at the LFs and MAFs, no significant impacts to the environment are anticipated.

4.3.3.2 Hazardous Waste Management

4.3.3.2.1 Explosive Implosion Alternative.

Due to the deactivation of LF-05, LF-06, LF-07 and LF-25, hazardous wastes are no longer generated at the LFs. However, small quantities of hazardous waste may be generated during dismantlement activities. The Air Force would ensure that the contractor follows applicable regulations for management of any hazardous waste generated and cleans up any spills or releases of fuel or oil from equipment. The Air Force would also ensure that the contractor disposes any hazardous waste generated on the property in accordance with applicable regulations at an approved off-site location. Any hazardous waste generated would be stored in appropriate containers with adequate spill containment/ protection. Because hazardous waste would be managed and disposed in accordance with applicable regulations, no significant impacts are anticipated.

4.3.3.2.2 Backfill Alternative.

Management of hazardous wastes would be similar to that described under the Explosive Implosion Alternative. The types and quantities of hazardous waste expected to be generated during dismantlement activities are anticipated to be similar to that discussed under the Explosive Implosion Alternative. Any hazardous waste generated would be stored in appropriate containers with adequate spill containment/protection. Because the Air Force would ensure that the contractor manages and disposes any hazardous waste generated in accordance with applicable regulations, no significant impacts are anticipated.

4.3.3.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs would continue to be maintained in caretaker status. Because hazardous waste is no longer used or stored at the LFs and MAFs, no significant impacts to the environment are anticipated.

4.3.3.3 Environmental Restoration Program Sites

4.3.3.3.1 Explosive Implosion Alternative.

Each of the LFs at Vandenberg AFB has been identified as an AOC site. AOC-175, located at LF-05 and AOC-186, located at LF-25, have been closed. AOC-180, located at LF-06 and AOC-181, located at LF-07, remain active. However, based on closure of the AOC sites at LF-05 and LF-25, and because the Air Force would retain the land upon dismantlement and would continue remediation and monitoring activities at LF-06 and LF-07, no impacts are anticipated to remediation activities.

4.3.3.3.2 Backfill Alternative.

Potential impacts to/from remediation activities under this alternative would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.3.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs would continue to be maintained in caretaker status. No significant impacts to the environment are anticipated.

4.3.3.4 Asbestos

4.3.3.4.1 Explosive Implosion Alternative.

ACM sampling was conducted at LF-07 in 1993 and at the storage facility associated with LF-25, with ACM detected in the sodium chromate tank insulation at LF-07. However, comprehensive ACM sampling has not been conducted. Therefore, it is assumed that ACM is present at the LFs. Workers

conducting dismantlement activities would be advised, to the extent known, of the type, condition, and amount of ACM present at the LFs. Dismantlement activities would be subject to applicable federal, state, and local regulations to minimize the potential risk to human health and the environment. Any ACM waste generated as a result of dismantlement activities would be disposed off-site in accordance with applicable regulations. Management of ACM and ACM waste in accordance with applicable regulations would preclude significant impacts. No significant impacts are anticipated.

4.3.3.4.2 Backfill Alternative.

Potential impacts from ACM would be similar to those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.3.4.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of ACM within the LFs. The Air Force would continue to manage ACM in accordance with current Air Force policy and applicable regulations. Management of ACM in accordance with applicable regulations would preclude significant impacts.

4.3.3.5 Lead-Based Paint

4.3.3.5.1 Explosive Implosion Alternative.

Due to the age of the LFs and MAFs, LBP would likely be encountered during dismantlement activities. Workers conducting dismantlement activities would be advised, to the extent known, of the type, condition, and amount of LBP present at the LFs. Dismantlement activities would be subject to applicable federal, state, and local regulations to minimize the potential risk to human health and the environment. Any LBP waste generated as a result of dismantlement activities would be disposed off-site in accordance with applicable regulations. Management of LBP and LBP waste in accordance with applicable regulations would preclude significant impacts.

4.3.3.5.2 Backfill Alternative.

Potential impacts from LBP would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.3.5.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of LBP within the LFs. The Air Force would continue to manage LBP in accordance with current Air Force policy and applicable regulations. Management of LBP in accordance with applicable regulations would preclude significant impacts.

4.3.3.6 Polychlorinated Biphenyls

4.3.3.6.1 Explosive Implosion Alternative.

Equipment containing PCBs has been removed from LF-05, LF-07, and LF-25. Equipment containing PCBs will be removed from LF-06 prior to initiating dismantlement activities. The presence of a weather sealing coating on the exterior concrete of the LF equipment buildings that contains solid PCB material noted at Malmstrom AFB and F.E. Warren AFB LFs is not present at the Vandenberg AFB LFs. Management of PCBs in accordance with applicable regulations would preclude significant impacts.

4.3.3.6.2 Backfill Alternative.

Potential impacts from PCBs would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.3.3.6.3 No-Action Alternative.

Under the No-Action Alternative, the Air Force would continue to be responsible for the management of PCBs within the LFs. The Air Force would continue to manage PCBs in accordance with current Air Force policy and applicable regulations. Management of PCBs in accordance with applicable regulations would preclude significant impacts.

4.3.3.7 Ordnance

4.3.3.7.1 Explosive Implosion Alternative.

Missile components, including PSREs, and boosters are not present as a result of missiles not being stored in the silos at Vandenberg AFB but rather being launched from the silos. Launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs have been removed from the LFs. However, under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). Concentric holes would be drilled vertically in the concrete of the headworks for the placement of explosives. To limit environmental impacts, the dismantlement design would specify limits on explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The demolition contractor would be required to use the minimum amount of explosives necessary to implode the concrete and steel into the launch tube. The explosive implosion of each LF would be designed to prevent the ejection of large pieces of debris outward from the launch tube (e.g., use of blast mats). The dismantlement contractor would also prepare and implement a blasting and safety plan and blasting activities would be supervised and performed by qualified individuals experienced in demolition blasting. Therefore, no significant impacts are anticipated.

4.3.3.7.2 Backfill Alternative.

Missile components, including PSREs, and boosters are not present as a result of missiles not being stored in the silos at Vandenberg AFB but rather being launched from the silos. Launch related ordnance such as explosive bolts, ballistic gas generators, retracting actuators, and impulse squibs have been removed from the LFs. No explosive implosion would occur under this alternative; therefore, no significant impacts are anticipated.

4.3.3.7.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. The LFs would continue to be maintained in caretaker status. No significant impacts from ordnance/explosive components are anticipated.

Mitigation Measures

Because no significant impacts to hazardous materials and hazardous waste management, ERP sites, ACM, LBP, PCBs, or ordnance have been identified, no mitigation measures would be required.

4.4 SOILS AND GEOLOGY

The potential effects of the alternative dismantlement options for silo dismantlement and No-Action Alternative on soils and geology within the ROI are presented in this section.

4.4.1 Malmstrom AFB

4.4.1.1 Explosive Implosion Alternative.

Soils. Under the Explosive Implosion Alternative, ground-disturbing activities would occur on less than one acre within the boundaries of the LFs; minimal soil disturbance is anticipated at the MAFs. Disturbances of soil can lead to increased rates of erosion, compaction, and changes in permeability, runoff, and other soil characteristics. Soil conditions may also limit the times that dismantlement activities can proceed. In northwestern Montana, soils are generally frozen from November until April, and potentially muddy during the late spring/early summer months. The dismantlement contractor may need to take precautions to avoid potential slumps and to prevent rutting, especially after heavy rains or if the soil is saturated. Allowing the soil to dry sufficiently before allowing work to be conducted, and utilizing standard construction procedures would minimize such issues. Short-term erosion impacts could also occur during ground-disturbing activities (i.e., grading). Potential impacts would be minimized through proper management practices defined within the approved SWPPP. Standard construction practices that could be implemented to minimize soil erosion include:

- Add protective cover, such as mulch or straw, to exposed soil

- The use of sediment control structures (e.g., silt fences) to minimize water-borne erosion
- Watering soil stockpiles in dry conditions to minimize wind erosion
- Implement site grading procedures that limit the time that soils are exposed prior to being covered by impermeable surfaces or gravel
- Implement storm water diversions to reduce water flow through exposed sites during dismantlement activities
- Implement temporary impoundments to catch soil eroded from the site
- Implement soil erosion plans in coordination with the local Natural Resources Conservation Service.

The construction contractor would likely be required to obtain a Construction Site Storm Water National Pollutant Discharge Elimination System (NPDES) (and/or Montana Pollutant Discharge Elimination System [MPDES]) permit before initiating any ground-disturbing activity. The area of ground disturbance at an LF is expected to be less than an acre and minimal disturbance is anticipated at each MAF for an overall total of approximately 50 acres of disturbance. Therefore, the dismantlement activity would qualify for inclusion under the General Permit for Storm Water Discharges Associated with Construction Activity. An SWPPP would also be prepared for proposed ground-disturbing activities. The Construction Site Storm Water NPDES permit, together with the required SWPPP, would outline site management practices designed to protect the quality of any surface water, groundwater, and natural environment through which they flow. The SWPPP would identify specific areas of existing and potential soil erosion, location of structural measures for sediment control, and management practices and controls. Use of these management practices and controls would reduce the potential for erosion of disturbed soils; therefore, no significant impacts are anticipated.

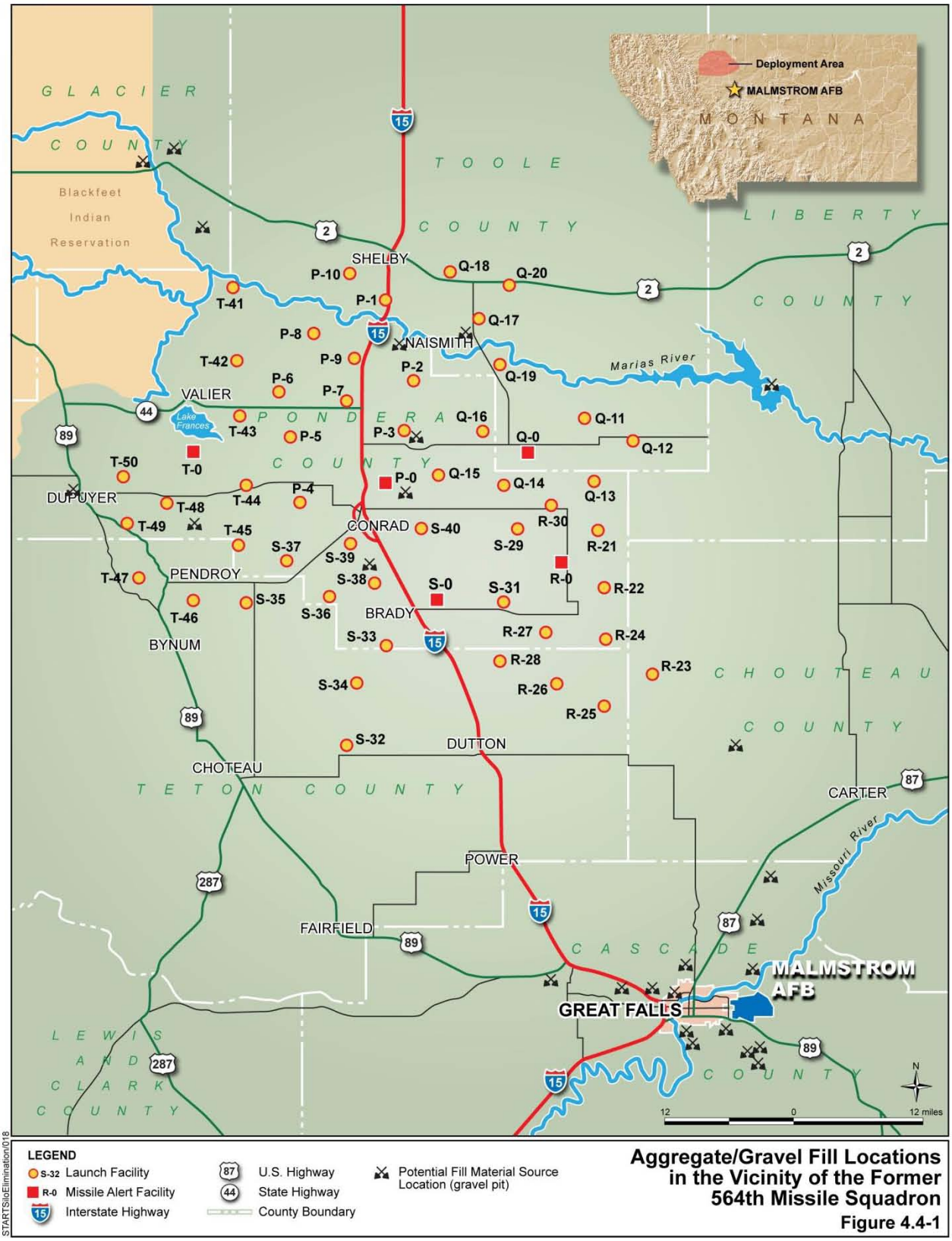
After the headworks of each LF have been demolished, it is estimated that up to 760 CYs of earth or gravel would be used to backfill the remainder of the LF and LFSB at each site. The access to the LFSB associated with LFs within the former 564 MS would be capped rather than filled reducing the total amount of fill needed at each LF. Approximately 165 CYs of clean earth or gravel would also be used to fill the LCC access at each MAF. Fill material would be excavated from established commercial borrow areas in the deployment area. Field rock in the immediate vicinity of each LF and gravel/fill dirt within the LF compound from initial excavation of the silo during construction could also be used to minimize the amount of material taken from borrow areas. Soil used for fill material must be free of wastes and of acceptable quality, with engineering characteristics of minimal shrink/swell potential and adequate compaction capability, so that the compaction of the soil would minimize the potential for future subsidence. The material would need to be properly compacted when the launch tubes are backfilled to prevent subsidence.

Aggregate/gravel for use in filling the LFs is readily available from multiple sources throughout the former 564 MS (Figure 4.4-1). Natural gravel sources occur in a variety of different geologic environments. In general, gravel is typically found in river valleys, and in alluvial floodplains along streams and in glacial deposits. Additional aggregate sources may be identified by the dismantlement contractor in support of dismantlement activities. Montana open cut mining laws regulate sand and gravel operations (MCA Title 82-Ch. 4) and require guidelines for reclamation procedures (ARM Title 17-Ch. 24). Gravel operations are subject to the Montana Environmental Policy Act, which requires Montana DEQ to conduct environmental assessments on every proposed operation. The Montana DEQ also issues permits for gravel operations, which specify conditions under which they operate. Local governments approve and oversee zoning and land use regulations that often result in additional conditions on gravel operations. Adequate notice of proposed sand and gravel operations allow local government and the public to comment on proposed sites and discuss the issues. Montana law requires gravel pit operators to reclaim mine sites within one year after mining activities have ceased. In addition, owners and operators are required to provide and maintain financial assurance in the form of a surety bond, to ensure that the reclamation activities will be accomplished after mining stops (Montana Contractors Association, 2012). No significant impact from use of regional gravel resources is anticipated.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). Because no removal action would occur, no ground disturbance would result; therefore, no significant impact to soils and geology from abandoning the HICS cable is anticipated.

Geology. Under the Explosive Implosion Alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of up to six meters (20 feet). Approximately 700 to 900 pounds of explosives were used for similar demolitions at Ellsworth, Whiteman, and Grand Forks AFBs. Several blasts at 25 millisecond delays were generated to produce an implosion (with the debris directed inward toward the center of the LF); this is the method that would be used for former 564 MS LF implosions. Ground vibrations induced by the blasts averaged around 0.15 inches per second or less at frequencies less than 40 hertz (Hz) and around 0.2 inches per second at frequencies of 40 Hz, as measured from a distance of 500 feet (U.S. Air Force, 1999). These vibrations were well within the contract-specified limitations of 0.75 inch per second at frequencies less than 40 Hz or 2.0 inches per second at frequencies of 40 Hz or greater, designed to prevent damage to nearby structures. This peak particle acceleration is roughly equivalent to an earthquake of II on the Modified Mercalli Scale or less than 2 on the Richter Scale. Explosive implosion would cause ground acceleration, but damage to nearby structures would be unlikely given the specified limits on peak particle velocity.

The shock waves could produce additional fractures in bedrock in the immediate vicinity (typically several hundred feet) of each LF. Additional demolition-produced fractures in the bedrock could alter the water table and normal



Aggregate/Gravel Fill Locations in the Vicinity of the Former 564th Missile Squadron

Figure 4.4-1

groundwater and surface-water flow by allowing more channels for flow transportation. Excavations for constructing the original Minuteman silos in the 1960s disturbed an area of up to 100 feet from the LFs to a depth of about 90 feet. Fill material for these excavations consists of unconsolidated soil, sand, and rock fragments. Although fracturing could occur as the result of explosive demolition, it would be limited to areas of undisturbed hard and brittle rock, and would not be widespread or significant. Based on the amount of explosives used for previous explosive demolitions and the limits of ground acceleration observed (no fracturing occurred), insignificant impacts to the subsurface geology is anticipated.

4.4.1.2 Backfill Alternative.

Soils. Under the Backfill Alternative, the silo door would be removed, dismantled, or destroyed and the silo would be completely filled with the resulting debris and with earth or gravel. Fill material would be hauled from existing commercial borrow locations to the silos and placed into the silo and LFSB. Field rock in the immediate vicinity of each LF and gravel/fill dirt within the LF compound from initial excavation of the silo during construction could also be used to minimize the amount of material taken from borrow areas. It is estimated that approximately 865 CYs of material would be required to fill each silo and LFSB under this alternative. The access to the LFSB associated with LFs within the former 564 MS would be capped rather than filled reducing the total amount of fill needed at each LF. Approximately 165 CYs of clean earth or gravel would also be used to fill the LCC access at each MAF. Although additional fill material would be required, potential impacts to soils would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

Geology. Since the only ground-disturbing activities under the Backfill Alternative would be the backfilling of the launch tube and re-grading the site, there are no potential effects on geology.

4.4.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. No ground-disturbing activities would occur. No significant impacts to soils and geology would be expected.

Mitigation Measures

Because management practices required by the Construction Site Storm Water NPDES permit and SWPPP would be implemented and dismantlement design specifications for explosive demolition would be adhered to, insignificant impacts to soils and geology are anticipated. Therefore, no mitigation measures would be required.

4.4.2 F.E. Warren AFB

4.4.2.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, impacts to soils and geology could occur during dismantlement activities. Potential impacts would be the same as those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.4.1.1). The use of standard construction practices and controls would reduce the potential for erosion of disturbed soils.

Aggregate/gravel for use in filling the LFs is one of the most abundant natural resources and is readily available from multiple sources throughout the former 400 MS (Figure 4.4-2). Construction aggregate is the fourth most important mineral product produced in Wyoming. Natural gravel sources occur in a variety of different geologic environments. They consist of unconsolidated gravel, or loosely to partially cemented gravel that can be dug out of a pit without blasting or cutting. Additional aggregate sources may be identified by the dismantlement contractor in support of dismantlement activities. A developed aggregate source is typically smaller than five acres. Wyoming has a ten-acre permit exemption for limited mining operations designed primarily for aggregate production. This exemption includes requirements for posting of a bond to ensure reclamation of the site is conducted once extraction of aggregate is completed. The application for limited mining operation is outlined under W.S. 35-11-401 (e)(vi). After the mining operation has ceased, or within 30 days after the abandonment of the mining operation, the operator must commence reclamation and restoration efforts. Reclamation must be consistent with the proposed post-mining land use and in accordance with the Environmental Quality Act (W.S. 35-11-101) (Wyoming Department of Environmental Quality, 2007f, Wyoming State Geological Survey, 2012).

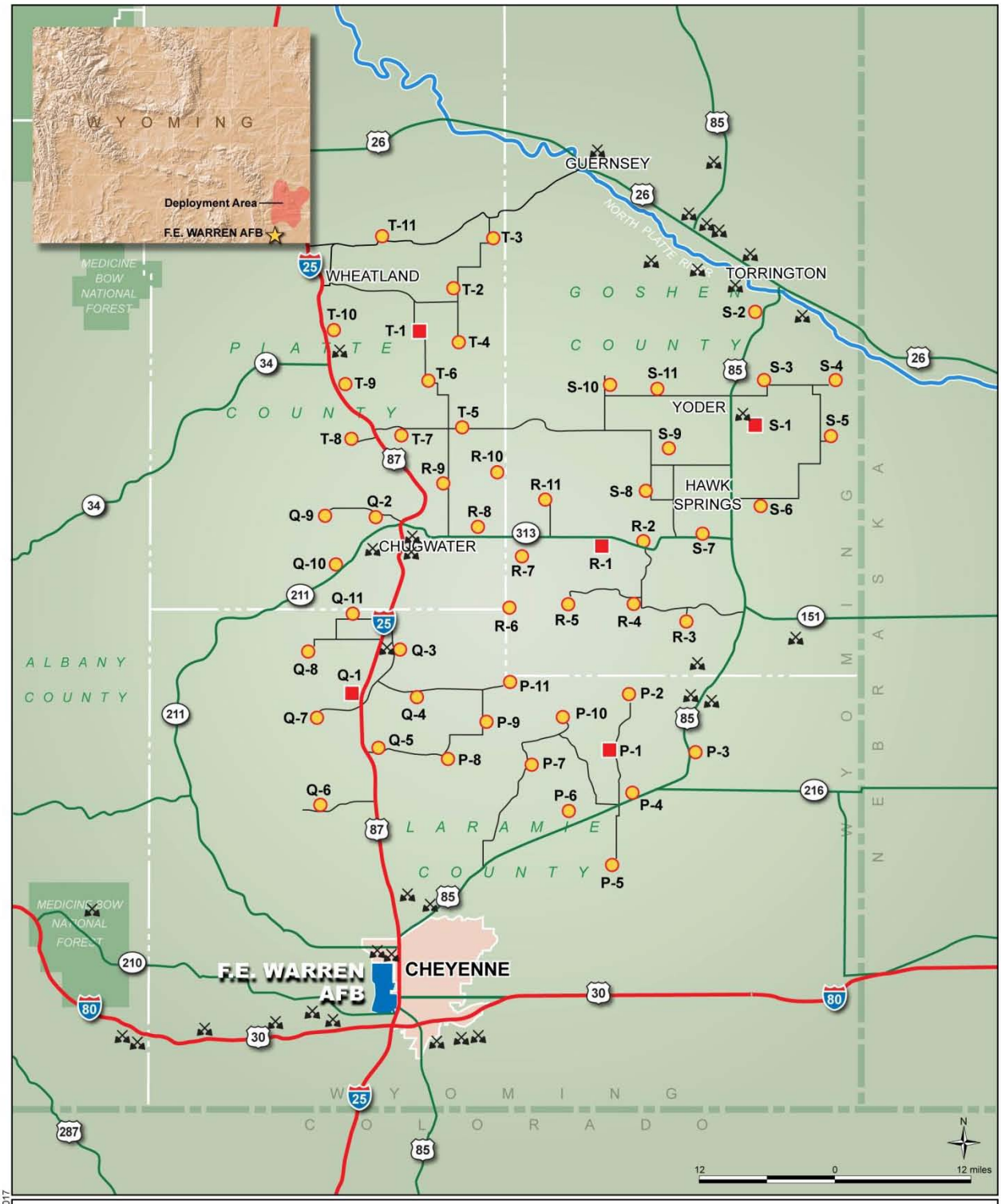
Based on the amount of explosives used for previous explosive demolitions and the limits of ground acceleration observed, and the availability of aggregate resources in the region, insignificant impacts to soils or the subsurface geology would occur.

4.4.2.2 Backfill Alternative.

Potential impacts to soils and geology would be the same as those discussed under the Malmstrom AFB Backfill Alternative (see Section 4.4.1.2). No significant impacts are anticipated.

4.4.2.3 No-Action Alternative.

Under the No-Action Alternative, deactivation activities would not be implemented. No ground-disturbing activities would occur. No significant impacts to soils and geology would be expected.



START\SiloElimination\017

Aggregate/Gravel Fill Locations in the Vicinity of the Former 400th Missile Squadron

Figure 4.4-2

Mitigation Measures

Because management practices required by the Construction Site Storm Water NPDES permit and SWPPP would be implemented and dismantlement design specifications for explosive demolition would be adhered to, insignificant impacts to soils and geology are anticipated. Therefore, no mitigation measures would be required.

4.4.3 Vandenberg AFB

4.4.3.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, impacts to soils and geology could occur during dismantlement activities. With the exception of no frozen soils, potential impacts would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.4.1.1).

Aggregate/gravel for use in filling the LFs is readily available from several sources in the vicinity of Vandenberg AFB (Figure 4.4-3). Fill material must be free of wastes and of acceptable quality, with engineering characteristics of minimal shrink/swell potential and adequate compaction capability. Large gravel producers are located in the vicinity of Vandenberg AFB; one site is adjacent to the Santa Maria River northeast of the base, near the city of Santa Maria, another site is south of the city of Lompoc (both locations are approximately 15 miles from the base). Santa Barbara County issues conditional use permits with associated approved reclamation plans (as well as appropriate rezoning) to allow aggregate mining. The objective of revegetation plans is to return the site to a stable self-sustaining plant community that can support post-mining land use without causing environmental degradation. Reclamation must provide adequate cover to minimize wind erosion and invasion of listed noxious weeds; and meet the cover, density, and established diversity criteria (Ventucopa GPS Mine, 2007).

Excavations for constructing the silos disturbed an area of up to 100 feet from the LFs to a depth of about 90 feet. Fill material for these excavations consists of unconsolidated soil, sand, and rock fragments. Based on the amount of explosives used for previous explosive demolitions and the limits of ground acceleration observed (no fracturing occurred), the likelihood of triggering an earthquake is considered small and insignificant impacts to the subsurface geology is anticipated. At Vandenberg AFB, the LFs are situated in close proximity (100 to 200 meters) to ravines and bluffs that overlook the beach. Ground movement as a result of explosive implosion could result in landslide hazards in these areas, which could affect stream flow and marine mammals (if on the beach). However, given their distance from these areas and the anticipated explosive shock wave (based on previous silo dismantlement efforts), a large landslide is not anticipated. The use of standard construction practices and controls would reduce the potential for erosion of disturbed soils and based on the amount of explosives used for previous explosive demolitions and the limits of ground acceleration observed, insignificant impacts to soils or the subsurface geology are anticipated.

Aggregate/Gravel Fill Locations in the Vicinity of Vandenberg AFB

Figure 4.4-3

4.4.3.2 Backfill Alternative.

Potential impacts to soils and geology would be the same as those discussed under the Malmstrom AFB Backfill Alternative (see Section 4.4.1.2). No significant impacts are anticipated.

4.4.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. No ground-disturbing activities would occur. No significant impacts to soils and geology would be expected.

Mitigation Measures

Because management practices required by the Construction Site Storm Water NPDES permit and SWPPP would be implemented and dismantlement design specifications for explosive demolition would be adhered to, insignificant impacts to soils and geology are anticipated. Therefore, no mitigation measures would be required.

4.5 WATER RESOURCES

The potential effects of the alternative dismantlement options for silo dismantlement and No-Action Alternative on water resources within the ROI are presented in this section.

4.5.1 Malmstrom AFB

The total area of the 50 LFs and five MAFs to be dismantled would be approximately 50 acres; the actual total area of disturbed ground is anticipated to be less than one acre at each LF. Although the locations of the 50 LFs and five MAFs are not close enough to each other to be included as part of a larger development (as the MPDES terms of a larger common plan of development are defined), the Air Force considers the dismantlement activity as a single effort within the entire MS area and will be evaluated as such.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). Because no removal action would occur, no ground disturbance would result; therefore, no significant impact to water resources from abandoning the HICS cable is anticipated.

4.5.1.1 Explosive Implosion Alternative.

Surface Water Runoff. Impacts to surface water under the Explosive Implosion Alternative would not be significant with the use of standard construction practices to limit sedimentation impacts, as required in stormwater management plans and erosion control specifications. The LFs and MAFs of the former 564 MS are not situated within a FEMA-designated 100-year flood plain, nor do jurisdictional wetlands exist at any of these facilities. Therefore, no impacts due to floodplain development or encroachment, or wetland loss are expected. In

addition, each site (within which ground disturbance could occur) is relatively small, and physical changes to watershed divides or stream channel locations are not expected.

The area of ground disturbance at an LF is expected to be less than an acre and minimal disturbance is anticipated at each MAF totaling approximately 50 acres of disturbance; therefore, the dismantlement activity would qualify for inclusion under the General Permit and would require that: (1) a Notice of Intent form be completed and filed with the Montana DEQ; (2) an SWPPP be prepared and submitted for approval; (3) appropriate fees be paid; and (4) a Notice of Termination be filed upon completion of the dismantlement activities.

Any changes to the ground surface condition would be temporary (on the order of weeks, not months), and no significant effect on runoff potential is expected either in the short-term over which these activities would occur, or after their completion. Following dismantlement activities, each site would be regraded to meet existing contours. Therefore, the nature of the ground surface before dismantlement would not change afterward, either in permeability or in topographic contour. The potential for soil erosion is expected to be minimal as a result of standard construction practices that would be implemented during dismantlement activities. There would be little likelihood of accelerated and unnatural changes to the surface topography due to erosion, and their resulting impacts on surface drainage would not be significant.

Groundwater. Under the Explosive Implosion Alternative, the shock from the explosions could disrupt shallow aquifers, disrupt low permeability material below an aquifer, or disrupt perched water tables. Disruption of lower units or the perched water table could allow water in the aquifer to drain or percolate at higher velocities through underlying units and thereby lower the level of the water table. This same mechanism could also connect aquifers of different yields and water qualities, leading to changes in supply and water quality for nearby users of either aquifer. Shock waves from an explosion could also cause a local change in the aquifer's gradient, change the direction of flow and possibly affect water quantities and quality for local users (U.S. Air Force, 1999). Studies done on the blasting effects on shallow, low-yield wells drawing from fractured rock in Appalachia indicate that a level of 2.0 inches per second peak velocity, the maximum allowable under the proposed blasting specifications for the proposed dismantlement activities, was not high enough to damage wells. Results of the blasting did include lateral stress relief, which increased the fracture width and the storage space in the aquifer, which, in turn, lowered the static water levels in local wells. Static water levels recovered where recharge to groundwater was sufficient (U.S. Air Force, 1999).

Demolition of rock for mining operations is designed to generate force outwards, whereas the explosive implosion of an LF is designed to generate the maximum amount of force inwards. Although some shallow fracturing of a formation could occur from explosive implosion demolition of the launcher headworks, it is unlikely that waters from the different aquifers would mix to any extent greater than normal. Because unconsolidated materials (deposits of gravel, sands, silts,

and clay) dominate the surficial layers within the former 564 MS, they would not be subject to fracturing (U.S. Air Force, 1999). Some minor settling could occur, causing a likely decrease in hydraulic conductivity of the layers. However, these impacts would not be significant.

In addition, the dismantlement effort for the silos at other Air Force deployment areas did not result in any documented impacts to local water supply wells.

Under the Explosive Implosion Alternative, dismantlement activities are not likely to affect aquifer recharge because the aquifer system is recharged by direct infiltration of precipitation and as seepage through the beds of streams or from irrigated land.

Water Quality. Following demolition of the headworks, residual LBP inside the launch tube, LCEB, and LCC could leach into the groundwater. Also, some coatings applied to help waterproof USTs, piping, and the LFSB contain solid PCBs. Due to the unconfined shallow aquifers found throughout the deployment area, there would be instances of eventual seepage of groundwater into the launch tube. The rate at which lead leaches from paint and PCBs leaches from coatings, and migrates to nearby shallow wells used for potable water, was calculated during the completion of an EIS for dismantlement activities at F.E. Warren AFB in 2000. The assumptions used in the quantification of contamination were based on the study of aquifer characteristics, water quantity and quality parameters, proximity of wells to LFs, concentration and volume of LBP in the launch tube, concentration and volume of PCBs in coatings, and the rate of leaching of lead and PCBs by groundwater. The model results of simulated groundwater transport over a 20-year period showed that lead and PCB concentrations that leached from LF coatings were not expected to exceed 0.02 parts per billion (ppb) in any of the modeled cells adjacent to the LFs. The model results indicated that both lead and PCBs were nearly immobile under the representative site conditions. Leaching of lead and PCBs would not add significantly to background levels at any wells that occur downgradient. The estimated levels of contamination are well below the U.S. EPA Maximum Contaminant Levels (MCLs) for lead [15 micrograms per liter (µg/L), or 15 ppb] and PCBs (0.5 µg/L, or 0.5 ppb). Levels of lead in groundwater would increase incrementally and would not significantly impact groundwater quality (F.E. Warren AFB, 2000). Groundwater monitoring at dismantled LFs associated with Whiteman AFB that contained solid PCB coatings did not detect PCBs in the groundwater, further confirming that the solid PCB material is not leachable (U.S. Geological Survey, 2002).

Other heavy metal additives in the paint (chromium and mercury), as well as cadmium electroplating, might also undergo leaching. Based on the amounts of heavy metals with respect to lead, it is anticipated that the concentrations of leachate would be appreciably lower than that calculated for lead. With MCLs of 2 µg/L for mercury, 10 µg/L for cadmium, and 50 µg/L for chromium, the leachate is anticipated to be at least an order of magnitude lower than the MCLs for these heavy metals (U.S. Air Force, 1999). Because the predicted concentrations of

heavy metals are significantly below health-based regulatory action levels, no long-term impacts to groundwater quality from heavy metals are anticipated.

Under the Explosive Implosion Alternative, the use of the explosive ammonium nitrate and fuel oil would result in some residual nitrogen that could enter groundwater. The nitrates in the explosive are typical of fertilizer and are in lower concentrations than those typically used in agriculture. Full detonation combusts all but a minuscule amount of trace residues of the original explosive. Some of the residual free nitrogen can penetrate the pore space of adjacent rocks or soil, and eventually be converted to nitrates. Pre- and post-blasting nitrogen sampling was conducted at two LFs at Ellsworth AFB during prior dismantlement actions. The nitrogen-anomalous material was restricted to the rubble concrete at each site. Total nitrogen increased by about 11 micrograms per gram (µg/g) (1.22 µg/g of nitrate and 10.1 µg/g of ammonium) at one of the LFs and about 17 µg/g (3.70 µg/g nitrate and 13.93 µg/g ammonium) at the second LF sampled. In a typical aquifer, about 40 percent of this concentration would dissolve into subjacent groundwater. This could result in a one-time addition of as much as 5 to 8 mg/L increase of nitrates in local groundwater. The amount of increased nitrogen concentrations at each site was about equal to that typically applied as a fertilizer to one acre of land used for growing wheat (U.S. Air Force, 1999). The potential concentration of nitrogen predicted would be somewhat less at Malmstrom AFB sites than for former missile sites in South Dakota because lower amounts of explosives would be used compared to amounts used at Ellsworth AFB. The concentration of nitrate in groundwater on an LF site would likely be less than the MCL of 10 mg/L. The amount of nitrogen generated from the explosive implosion of the 564 MS facilities would range from roughly half to equal the amount typically applied as fertilizer in crop production areas, such as winter wheat, alfalfa, beans, sugar beets, corn, small grains (e.g., millet, oats, and barley), and oilseeds (e.g., sunflowers). The estimated one-time loading to groundwater would be subject to dilution, diffusion, advection, and chemical and biological degradation as groundwater would migrate from the site. Consequently, this short-term impact would not be significant, nor would it result in any long-term impacts.

4.5.1.2 Backfill Alternative

Surface Water Runoff. Under the Backfill Alternative, potential impacts to surface water would be similar to that discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.5.1.1).

Groundwater. Under the Backfill Alternative, explosives would not be used as part of the demolition effort. Therefore, potential effects to groundwater resulting from the use of explosives (i.e., the shock from the explosions disrupting shallow aquifers, etc.) are not anticipated. Dismantlement activities under the Backfill Alternative are not likely to affect aquifer recharge.

Water Quality. Under the Backfill Alternative, explosives would not be used as part of the demolition effort. Therefore, potential effects to groundwater quality resulting from the use of explosives, such as the increase in nitrate

concentrations, are not anticipated. Other potential impacts to water quality would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.5.1.1). Levels of lead and PCBs in groundwater would increase incrementally and would not significantly impact groundwater quality, and no long-term impacts to groundwater quality from heavy metals are anticipated.

4.5.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. No ground-disturbing activities would occur; therefore, no significant impacts to water resources would be expected.

Mitigation Measures

Because management practices required by the Construction Site Storm Water NPDES permit and SWPPP would be implemented, no significant impacts to water resources are anticipated. Therefore, no mitigation measures would be required.

4.5.2 F.E. Warren AFB

The total area of the 50 LFs and five MAFs to be disturbed during dismantlement activities would be approximately 50 acres; the actual total area of disturbed ground is anticipated to be less than one acre at each LF and approximately one acre at the sewage lagoons at each MAF. Although the locations of the 50 LFs and five MAFs are not close enough to each other to be included as part of a larger development, the Air Force considers the dismantlement activity as a single effort within the entire MS area and will be evaluated as such.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). Because no removal action would occur, no ground disturbance would result; therefore, no significant impact to water resources from abandoning the HICS cable is anticipated.

4.5.2.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, impacts to water resources could occur during dismantlement activities. Potential impacts would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.5.1.1). Potential impacts to water resources would not be significant.

4.5.2.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to water resources would be similar to those discussed under the Malmstrom AFB Backfill Alternative (see Section 4.5.1.2). Potential impacts to water resources would not be significant.

4.5.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. No ground-disturbing activities would occur; therefore, no significant impacts to water resources would be expected.

Mitigation Measures

Because management practices required by the Construction Site Storm Water NPDES permit and SWPPP would be implemented, no significant impacts to water resources are anticipated. Therefore, no mitigation measures would be required.

4.5.3 Vandenberg AFB

The total area of the 4 LFs to be dismantled would be approximately 4 acres; the actual total area of disturbed ground is anticipated to be less than one acre at each LF.

4.5.3.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, impacts to water resources could occur during dismantlement activities. Potential impacts would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.5.1.1). Potential impacts to water resources would not be significant.

4.5.3.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to water resources would be similar to those discussed under the Malmstrom AFB Backfill Alternative (see Section 4.5.1.2). Potential impacts to water resources would not be significant.

4.5.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. No ground-disturbing activities would occur; therefore, no significant impacts to water resources would be expected.

Mitigation Measures

Because management practices required by the Construction Site Storm Water NPDES permit and SWPPP would be implemented, no significant impacts to water resources are anticipated. Therefore, no mitigation measures would be required.

4.6 AIR QUALITY

The potential effects of the alternative dismantlement options for silo dismantlement and the No-Action Alternative on air quality within the ROI are presented in this section.

4.6.1 Malmstrom AFB

4.6.1.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, potential air quality impacts are expected to be primarily from construction equipment and truck operations (i.e., loading, hauling, and dumping fill material) in the vicinity of each LF and MAF, as well as from fugitive dust associated with dismantlement activities.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). Because no removal action would occur, no increase in emissions from construction equipment or ground disturbance would result.

Criteria pollutant emissions generated by the dismantlement activities were calculated using the U.S. EPA-developed NONROAD emission factor model and the equipment usage hours. The demolishing equipment and vehicle operation hours were estimated primarily based on RS Means handbook guidance. On site vehicular emissions were estimated using Mobile 6 model for Malmstrom AFB and the likely average travel time for both fill trucks and worker's commuting vehicles.

Because the area in which the former 564 MS is situated is in attainment of the NAAQS, the general conformity rule applicability analysis is not required for the proposed silo dismantlement. However, for NEPA disclosure purposes, the EA includes an emissions analysis that quantifies likely demolition activity-associated emissions with potential to occur in a similar way as established for the general conformity rule applicability analysis. Because air emissions would typically have effects on local and/or regional (i.e., air pollution control region where a project site is located) levels and the three silo dismantlement efforts are not located in the same region, the emissions were analyzed and summarized separately for each location (i.e., former 564 MS, former 400 MS, and Vandenberg AFB). The emissions analysis for the Explosive Implosion Alternative within the former 564 MS is included in Table 4.6-1.

Table 4.6-1. Explosive Implosion Alternative Total Emission Levels - Former 564 MS

	Pollutant (tons)						
Emission Source	**VOC**	**NO_X**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**CO_2e**
Construction Equipment	0.26	2.60	2.26	0.16	0.15	0.10	272.50
Motor Vehicles	0.07	0.53	0.35	0.02	0.02	0.00	181.51
Total Emission	0.33	3.13	2.61	0.18	0.17	0.10	454.01

CO = carbon monoxide
CO_2e = carbon dioxide equivalent
NO_X = nitrogen oxide
$PM_{2.5}$ = particulate matter equal to or greater than 2.5 microns in diameter
PM_{10} = particulate matter equal to or greater than 10 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compound

The Explosive Implosion Alternative would result in a slightly greater amount of air emissions as compared to the Backfill Alternative in general. However, if applying the de minimis levels established in the general conformity rule analysis, the emission levels for each criteria pollutant would be well below the de minimis thresholds for the former 564 MS area under either alternatives. Therefore, no significant impact to air quality is anticipated.

Greenhouse Gas Emissions. For disclosure purposes, dismantlement activity associated greenhouse gases in terms of CO_2e emissions were also estimated for the Explosive Implosion Alternative using the same methodologies for criteria pollutants and summarized in Table 4.6-1. Greenhouse gas emissions would be negligible and not be considered significant.

4.6.1.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to air quality would be similar to those described under the Explosive Implosion Alternative except that air emissions produced by backfilling activities would be somewhat less as compared to the Explosive Implosion Alternative. The emissions analysis for the Backfill Alternative within the former 564 MS is included in Table 4.6-2.

Table 4.6-2. Backfill Alternative Total Emission Levels - Former 564 MS

	Pollutant (tons)						
Emission Source	**VOC**	**NO_X**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**CO_2e**
Construction Equipment	0.21	2.12	2.06	0.13	0.13	0.05	228.23
Motor Vehicles	0.06	0.52	0.29	0.02	0.02	0.00	171.03
Total Emission	0.27	2.64	2.35	0.15	0.15	0.05	399.26

Given the similar magnitude of development scale among this alternative and the Explosive Implosion Alternative, potential air quality impact from the Backfill Alternative would not be significant.

Greenhouse Gas Emissions. For disclosure purposes, dismantlement activity associated greenhouse gases in terms of CO_2e emissions were also estimated for the Backfill Alternative using the same methodologies for criteria pollutants and summarized in Table 4.6-2. Greenhouse gas emissions would be negligible and not be considered significant.

4.6.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. No emissions associated with construction equipment would occur; therefore, no significant impacts to air quality are anticipated.

Mitigation Measures. No mitigation measures would be required.

4.6.2 F.E. Warren AFB

4.6.2.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, impacts to air resources could occur during dismantlement activities. Potential impacts would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.6.1.1). The emissions analysis for the Explosive Implosion Alternative within the former 400 MS is included in Table 4.6-3. No significant impacts to air quality are anticipated.

Table 4.6-3. Explosive Implosion Alternative Total Emission Levels - Former 400 MS

	Pollutant (tons)						
Emission Source	**VOC**	**NO_X**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**CO_2e**
Construction Equipment	0.26	2.63	2.28	0.16	0.15	0.10	276.64
Motor Vehicles	0.07	0.54	0.35	0.02	0.02	0.00	183.77
Total Emission	0.33	3.17	2.63	0.18	0.17	0.10	460.41

Greenhouse Gas Emissions. For disclosure purposes, dismantlement activity associated greenhouse gases in terms of CO_2e emissions were also estimated for the Explosive Implosion Alternative using the same methodologies for criteria pollutants and summarized in Table 4.6-3. Greenhouse gas emissions would be negligible and not be considered significant.

4.6.2.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to air quality would be similar to those described under the Explosive Implosion Alternative except that air emissions produced by backfilling activities would be somewhat less as compared to the Explosive Implosion Alternative. The emissions analysis for the Backfill Alternative within the former 400 MS is included in Table 4.6-4.

Table 4.6-4. Backfill Alternative Total Emission Levels - Former 400 MS

	Pollutant (tons)						
Emission Source	**VOC**	**NO_X**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**CO_2e**
Construction Equipments	0.21	2.16	2.08	0.13	0.13	0.05	233.17
Motor Vehicles	0.06	0.52	0.29	0.02	0.02	0.00	173.36
Total Emission	0.27	2.68	2.37	0.15	0.15	0.05	406.53

Given the similar magnitude of development scale among this alternative and the Explosive Implosion Alternative, potential air quality impact from the Backfill Alternative would not be significant.

Greenhouse Gas Emissions. For disclosure purposes, dismantlement activity associated greenhouse gases in terms of CO_2e emissions were also estimated for the Backfill Alternative using the same methodologies for criteria pollutants

and summarized in Table 4.6-4. Greenhouse gas emissions would be negligible and not be considered significant.

4.6.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. No emissions associated with construction equipment would occur; therefore, no significant impacts to air quality are anticipated.

Mitigation Measures. No mitigation measures would be required.

4.6.3 Vandenberg AFB

4.6.3.1 Explosive Implosion Alternative.

The Explosive Implosion Alternative would result in a slightly greater amount of air emissions as compared to the Backfill Alternative in general. However, if applying the de minimis levels established in the general conformity rule analysis, the emission levels for each criteria pollutant would be well below the de minimis thresholds for the Vandenberg AFB area under either alternative. The total emissions analysis for dismantlement activities at Vandenberg AFB is included in Tables 4.6-5. No significant impacts to air quality are anticipated.

Table 4.6-5. Explosive Implosion Alternative Total Emission Levels - Vandenberg AFB

	Pollutant (tons)						
Emission Source	**VOC**	**NO_X**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**CO_2e**
Construction Equipment	0.02	0.37	0.14	0.00	0.00	0.01	40.12
Motor Vehicles	0.02	0.12	0.13	0.00	0.00	0.00	21.15
Total Emission	0.04	0.49	0.27	0.00	0.00	0.01	61.27

Greenhouse Gas Emissions. For disclosure purposes, dismantlement activity associated greenhouse gases in terms of CO_2e emissions were also estimated for the Explosive Implosion Alternative using the same methodologies for criteria pollutants and summarized in Table 4.6-5. Greenhouse gas emissions would be negligible and not be considered significant.

4.6.3.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to air resources would be similar to those described under the Explosive Implosion Alternative except that air emissions produced by backfilling activities would be somewhat less as compared to the Explosive Implosion Alternative. The emissions analysis for the Backfill Alternative at Vandenberg AFB is included in Table 4.6-6. No significant impacts are anticipated.

Greenhouse Gas Emissions. For disclosure purposes, dismantlement activity associated greenhouse gases in terms of CO_2e emissions were also estimated for the Backfill Alternative using the same methodologies for criteria pollutants

Table 4.6-6. Backfill Alternative Total Emission Levels - Vandenberg AFB

	Pollutant (tons)						
Emission Source	**VOC**	**NO_X**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**CO_2e**
Construction Equipment	0.00	0.29	0.12	0.00	0.00	0.00	31.32
Motor Vehicles	0.02	0.14	0.15	0.00	0.00	0.00	18.22
Total Emission	0.02	0.43	0.27	0.00	0.00	0.00	49.54

and summarized in Table 4.6-6. Greenhouse gas emissions would be negligible and not be considered significant.

4.6.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. No emissions associated with construction equipment would occur; therefore, no significant impacts to air quality are anticipated.

Mitigation Measures. No mitigation measures would be required.

4.7 NOISE

The potential effects of the Proposed Action and No-Action Alternative on noise within the ROI are presented in this section.

4.7.1 Malmstrom AFB

4.7.1.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, temporary impacts from blast noise (primarily from the LF headworks demolition) and construction noise (dump trucks, concrete trucks, graders, bulldozers, and general-purpose vehicles) could occur during dismantlement activities. Demolition explosions would produce both ground-borne vibration and air-propagated noise (airblast). Ground vibration can shake houses or other structures. However, ground wave motions that have a peak particle velocity less than 2 inches per second have a low probability of causing damage (Bollinger, 1971). Air-propagated noise typically arrives slightly later than ground-borne vibration and can produce overpressures that may be perceived as thunder. Ground vibration and airblast can act together to cause windows to rattle and walls and other structural elements to shake. Breakage of windows, however, is rarely observed with overpressures less than 0.1 pounds per square inch (lb/in^2) (150 dB). The actual demolition noise impacts that would be anticipated would vary with the area's topography. In general, the flat to rolling topography of the landscape in the area of the former 564 MS would somewhat attenuate the airblast impacts. Likely impacts include shaking of houses, rattling of windows, and possible annoyance of residents. The extent of such impacts depends on the quantity of explosives required for demolition and the distance from the demolition activity to the affected properties. Factors affecting the distance and intensity of the airblast include air temperature, humidity, windspeed, and direction. Higher air temperatures and humidity increase the speed of sound, while windspeed and direction determine the direction and

distance the airblast travels. As discussed in Section 3.7.1, few residences or other sensitive receptors are located near the LFs. Given the rural environment surrounding the LFs, it is unlikely any sensitive receptors would be adversely affected by a demolition event. To lessen the noise impacts due to the use of explosives, the following specifications would apply:

- Blasting would be supervised and performed by qualified individuals experienced in demolition blasting.
- Blast-induced ground vibrations would not exceed a peak ground particle velocity of 0.75 inch per second at frequencies less than 40 Hz nor 2.0 inches per second at frequencies of 40 Hz or greater.
- The maximum airblast sound level would not exceed 134 dB at a distance of 500 feet.
- Flying debris from blasting would not travel beyond the fenced area of the LF.
- Ground vibration and airblast noise would be monitored for every explosion. At the first demolition site, the contractor would demonstrate the ability to perform in compliance with the above specifications and would follow the procedures found to be effective and in compliance at future sites, unless the contracting officer issued written approval for deviations from those procedures.

The dismantlement contractor would prepare and implement a blasting and safety plan that includes provisions for modifying blasting techniques (e.g., elect to use millisecond delays) to satisfy stringent limits if houses or structures are located close to demolition sites; this would reduce the intensity of airblast and ground vibration. The plan would also address the repair of windows or other items inadvertently damaged by a demolition blast.

Noise generated by construction equipment could also produce localized noise events of 100 dBA or higher at each LF and MAF, with noise levels decreasing with distance from the facilities. Construction vehicles would be operating at each LF and MAF, and would be used to fill in the silos and elevator shafts, place concrete seals on the shafts, and grade the sites. The vehicles would be at the sites periodically for two to three weeks total, with normal work hours from 7:00 a.m. to 5:00 p.m. Typical noise levels at construction sites have been measured from 85-88 dBA at a distance of 50 feet. This would attenuate to about 78 to 82 dBA at 100 feet, and 72 to 76 dBA at 200 feet, and below 65 dBA at 800 feet. Enforcement of OSHA guidelines for hearing protection for workers at each LF and MAF would be the responsibility of the dismantlement contractor. Signs warning nearby residents of high noise levels would be posted at the LFs and MAFs by the dismantlement contractor, if noise levels warrant this measure. While noise may be a temporary source of annoyance for residents, it would not be at levels that would require hearing protection measures.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). Because no removal action would occur, no increase in noise from construction equipment would result.

Noise generated from proposed dismantlement activities would be intermittent and short term, and would primarily occur in the immediate vicinity of the LFs and MAFs. Once dismantlement activities are completed, noise levels would return to ambient pre-dismantlement levels. Therefore, no significant impacts are anticipated.

4.7.1.2 Backfill Alternative.

Under the Backfill Alternative, temporary impacts from construction noise (dump trucks used to fill in the silos and elevator shafts, grade the sites, etc.) could occur during dismantlement activities. Impacts from construction noise would be similar to those described under the Explosive Implosion Alternative with the elimination of the use of explosives. Noise generated from proposed dismantlement activities would be intermittent and short term, and would primarily occur in the immediate vicinity of the LFs and MAFs. Once dismantlement activities are completed, noise levels would return to ambient pre-dismantlement levels. Therefore, no significant impacts are anticipated.

4.7.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. No noise impacts would occur because noise levels near the LF and MAF locations would be the same as current conditions.

Mitigation Measures

No significant noise impacts are anticipated with adherence to blast specifications; therefore, no mitigation measures are required.

4.7.2 F.E. Warren AFB

4.7.2.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, temporary impacts from blast and construction noise could occur during dismantlement activities. Potential noise impacts would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.7.1.1). Noise generated from proposed dismantlement activities would be intermittent and short term, and would primarily occur in the immediate vicinity of the LFs and MAFs. Once dismantlement activities are completed, noise levels would return to ambient levels. Therefore, no significant impacts are anticipated.

4.7.2.2 Backfill Alternative.

Potential noise impacts would be similar to those discussed under the Malmstrom AFB Backfill Alternative (see Section 4.7.1.2). Noise generated from

proposed dismantlement activities would be intermittent and short term, and would primarily occur in the immediate vicinity of the LFs and MAFs. Once dismantlement activities are completed, noise levels would return to ambient levels. Therefore, no significant impacts are anticipated.

4.7.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. No noise impacts would occur because noise levels near the LF and MAF locations would be the same as current conditions.

Mitigation Measures

No significant noise impacts are anticipated with adherence to blast specifications; therefore, no mitigation measures are required.

4.7.3 Vandenberg AFB

4.7.3.1 Explosive Implosion Alternative.

Under the Explosive Implosion Alternative, temporary impacts from blast and construction noise could occur during dismantlement activities. Potential noise impacts would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.7.1.1). However, due to the isolated nature of the LF sites on Vandenberg AFB, no sensitive receptors (i.e., residences, hospitals, or churches) are located in the vicinity. Therefore, no significant impacts are anticipated. See Section 4.8.3.1 for a discussion of potential noise effects to biological resources.

4.7.3.2 Backfill Alternative.

Potential noise impacts would be the same as those discussed under the Malmstrom AFB Backfill Alternative (see Section 4.7.1.2). However, as stated previously, due to the isolated nature of the LF sites on Vandenberg AFB, no sensitive receptors are located in the vicinity. Therefore, no significant impacts are anticipated.

4.7.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not occur. No noise impacts would occur because noise levels near the LF locations would be the same as current conditions.

Mitigation Measures

No significant noise impacts are anticipated with adherence to blast specifications; therefore, no mitigation measures are required.

4.8 BIOLOGICAL RESOURCES

The potential effects of the Proposed Action and No-Action Alternative on biological resources (i.e., vegetation, wildlife, threatened and endangered species, and sensitive habitats) within the ROI are presented in this section.

If rodent clean-up is necessary, Hantavirus precautions would be taken. Personnel participating in rodent clean-up or control would have precautions demonstrated to them including personal protective equipment recommendations.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). Because no removal action would occur, no ground disturbance would result; therefore, no significant impact to biological resources from abandoning the HICS cable is anticipated.

Aggregate/gravel would be brought to the LFs and MAFs from other locations. If the fill material is excavated from existing borrow areas, no significant impact to vegetation or habitat would be expected. Excavating fill material could affect wildlife habitat at that location; however, borrow pit siting and operation are approved through county and state permitting processes, and would be approved for the purpose of excavating fill material. The permitting process includes environmental analysis to ensure threatened and endangered plant and animal species are not impacted.

4.8.1 Malmstrom AFB

4.8.1.1 Explosive Implosion Alternative.

Vegetation. The dismantlement activities at the LFs and MAFs of the former 564 MS would occur in a graveled, unvegetated area within a fenced compound. Dust generated from construction equipment is expected to be similar to typical farming activities, except grading, filling, and other activities would be of short duration (lasting from hours to a few days). The explosive demolition of the LFs would generate a small dust cloud that would dissipate rapidly. Past experience with explosive demolition at Whiteman AFB and Ellsworth AFB missile fields confirms that the explosion generates a puff of smoke that settles quickly, typically within a half minute based on video of implosion activities at these sites.

Following dismantlement activities, and after the 60-day observation/verification period, the LF sites would be graded to meld with existing contours and to provide proper runoff. No significant impact to vegetation is anticipated.

Wildlife. Increased human activity and noise levels in the immediate vicinity of the LFs or MAFs during dismantlement activities could affect resident wildlife within the ROI. Resident wildlife (e.g., ground squirrels) would likely be temporarily displaced due to the increased activity and noise. Displacement of common wildlife species is not considered significant due to their abundance and their ability to seek similar habitat in the surrounding area. Wildlife species

temporarily displaced would likely return to the area and establish population levels similar to pre-dismantlement levels.

After dismantlement activities are completed, ambient noise levels would be similar to existing levels. Because Air Force activities would cease within the ROI, fewer wildlife disturbances would occur. The potential effects of dismantlement activities on wildlife would not be significant.

Threatened and Endangered Species. Based on information included in the Malmstrom AFB INRMP, there are no federally or state-listed species of concern or designated critical habitat within the boundaries of the LFs or MAFs of the former 564 MS. A letter issued by the USFWS supports this determination (U.S. Fish and Wildlife Service, 2011a) (see Appendix C).

Dismantlement activities would occur on previously disturbed land. Protected birds that may migrate through the area may be temporarily startled by noise associated with dismantlement activities; however, no significant impacts are anticipated as a result of dismantlement activities.

Sensitive Habitats. No jurisdictional wetlands have been identified within the boundaries of the LFs and MAFs. Ground disturbance during the dismantlement activities could increase soil erosion from wind and water runoff; however, erosion control measures would be implemented to minimize potential erosion effects. Potential impacts to sensitive habitats would not be significant.

4.8.1.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to vegetation, wildlife, threatened and endangered species, and sensitive habitats would be similar to those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.8.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. Ground surfaces at the LFs and MAFs would continue to be maintained. Therefore, no significant impacts to biological resources are anticipated.

Mitigation Measures

Because no significant impacts to biological resources have been identified, no mitigation measures would be required.

4.8.2 F.E. Warren AFB

4.8.2.1 Explosive Implosion Alternative.

Vegetation. The dismantlement activities of the LFs and MAFs of the former 400 MS would occur in a graveled, unvegetated area within a fenced compound.

Potential vegetation impacts would be similar to those discussed under the Malmstrom AFB Explosive Implosion Alternative (see Section 4.8.1.1). Because dismantlement activities would occur within the graveled area, no significant impacts to vegetation are anticipated.

Wildlife. Dismantlement activities within the former 400 MS could temporarily affect resident wildlife species. Project activities would temporarily increase traffic to each site, would require the use of heavy equipment, and temporarily increase human presence at the LFs and MAFs during dismantlement activities. Most of the species known to inhabit the LF and MAF areas are common and/or disturbance tolerant. Potential impacts to wildlife include displacement of individuals to adjacent areas. These impacts to common wildlife species are not expected to be significant.

Threatened and Endangered Species. Dismantlement activities would occur on previously disturbed land. However, if disturbance is planned during mountain plover (species of concern) nesting season (April 10 – July 10), a pre-construction bird survey would be required within 3 days prior to such activity. If an active nest is identified within the project site, proposed dismantlement activities would be delayed 37 days, or seven days post-hatching. If flightless clicks are observed, dismantlement activities would be delayed at least seven days. Appendix C contains USFWS guidance for mountain plover concerns. Other protected birds that may migrate through the area (e.g., peregrine falcon, bald eagle), may be temporarily startled by noise associated with dismantlement activities; however, no significant impacts are anticipated as a result of dismantlement activities.

Sensitive Habitats. No jurisdictional wetlands have been identified within the boundaries of the LFs and MAFs. Ground disturbance during the dismantlement activities could increase soil erosion from wind and water runoff. However, erosion control measures would be implemented to minimize potential erosion effects. Potential impacts to sensitive habitats would not be significant.

4.8.2.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to vegetation, wildlife, threatened and endangered species, and sensitive habitats would be similar to those described under the Explosive Implosion Alternative (see Section 4.8.2.1). No significant impacts are anticipated.

4.8.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. Ground surfaces at the LFs and MAFs would continue to be maintained. Therefore, no significant impacts to biological resources are anticipated.

Mitigation Measures

Because no significant impacts to biological resources have been identified, no mitigation measures would be required.

4.8.3 Vandenberg AFB

4.8.3.1 Explosive Implosion Alternative.

Vegetation. The dismantlement activities of each LF would occur in an asphalt-paved area within a fenced compound. A 25-foot fuelbreak (maintained by blading) also extends beyond the perimeter security fencing of each LF. Because dismantlement activities would occur within the paved area, no effects to vegetation would occur at the LFs.

Wildlife. Increased human activity and noise levels in the immediate vicinity of the LFs during dismantlement activities could affect resident or migratory wildlife within the ROI. The LFs are located in relative close proximity to the Pacific Ocean, however; they are fenced, restricted access areas where only birds and small mammals such as mice, ground squirrels, or rabbits are likely to occur.

Several bat species known to be present on Vandenberg AFB may also be present at the LFs. Prior to initiating dismantlement activities, a qualified biologist would inspect the LFs and any adjacent buildings to determine whether bats are roosting. If bats are present, passive exclusion would be conducted (prior to the start of maternity season in May) to allow bats to leave but to prevent their return.

Dismantlement activities could temporarily affect some individual wildlife species. Project activities would temporarily increase traffic to each site, would require the use of heavy equipment, and temporarily increase human presence at the LFs during dismantlement activities. Most of the species known to inhabit the LF area are common and/or disturbance tolerant. Potential impacts to wildlife include displacement of individuals to adjacent areas. Because dismantlement activities would occur within the paved area and species likely to inhabit the LF areas are disturbance tolerant, potential impacts to wildlife species are not expected to be significant.

Noise disturbance associated with dismantlement activities (e.g., explosive implosion) could produce a momentary “startle effect” on marine mammal species. However, noise associated with dismantlement activities is temporary and explosive implosion noise would be of shorter duration and less intensity than typical launch events at Vandenberg AFB. Conducting explosive implosion activities during high tide would further limit or minimize potential startle effects to marine mammals that haul out on Vandenberg AFB beaches. Because the implosion noise would be less than typical launch activities and measures would be implemented, to the extent practicable to reduce startle effects, potential impacts to marine wildlife would not be considered significant.

There is no likelihood for impacts to marine mammals in offshore environments as a result of onshore dismantlement activities. The LFs at Vandenberg AFB are situated in close proximity (100 to 200 meters [328-656 feet]) to bluffs that overlook the beach. Ground movement as a result of explosive implosion could result in landslide hazards in these areas, which could affect marine mammals (if on the beach). However, given the LFs distance from these areas and the anticipated explosive shock wave (based on previous silo dismantlement efforts), a large landslide is not anticipated; therefore, potential impacts to wildlife would be insignificant.

Threatened and Endangered Species. Dismantlement activities associated with the Proposed Action would occur on previously disturbed, asphalt-paved areas. Populations of Gaviota tarplant, seacliff buckwheat, and black-flowered figwort identified in the vicinity of the LFs are outside the area of direct impact. However, impacts from dust created during dismantlement activities as well as increased vehicular traffic could occur. To limit potential impacts, the dismantlement design would specify limits on explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The demolition contractor would be required to use the minimum amount of explosives necessary to implode the concrete and steel into the launch tube. The explosive implosion of each LF would be designed to prevent the ejection of large pieces of debris outward from the launch tube (e.g., use of blast mats), and would include dust control measures.

Furthermore, based on the Vandenberg AFB PBO (8-8-09-F-10) issued by the USFWS, base operations included in the PBO (e.g., missile and space launches, airfield and flight test operations, helicopter operations, infrastructure support and development, demolition of structures and buildings, landscaping, etc.) (U.S. Fish and Wildlife Service, 2011b) there would be no effect to the continued existence of listed species as there are no listed species within the area of impact.

Sensitive Habitats. No jurisdictional wetlands or other sensitive habitats have been identified within the boundaries of the LFs. Ground disturbance during the dismantlement activities could increase soil erosion from wind and water runoff; however, erosion control measures would be implemented to minimize potential erosion effects. Potential impacts to sensitive habitats would not be significant.

4.8.3.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to vegetation, wildlife, threatened and endangered species, and sensitive habitats would be similar to those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.8.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. Ground surfaces at the LFs would continue to be maintained. Therefore, no significant impacts to biological resources are anticipated.

Mitigation Measures

Because no significant impacts to biological resources have been identified, no mitigation measures would be required.

4.9 CULTURAL RESOURCES

The potential effects of the Proposed Action and No-Action Alternative on cultural resources (i.e., prehistoric and historic archaeological resources, historic buildings and structures, and traditional cultural resources) within the ROI are presented in this section.

The buried HICS cable that connects the LFs to the MAFs would be abandoned in place (up to 6 feet below ground surface). Because no removal action would occur, no ground disturbance would result; therefore, no significant impact to cultural resources from abandoning the HICS cable is anticipated.

4.9.1 Malmstrom AFB

4.9.1.1 Explosive Implosion Alternative.

Prehistoric and Historic Archaeological Resources. Dismantlement activities would not be expected to affect any prehistoric or historic archaeological resources. Ground-disturbing activities at LF and MAF sites would not affect any known archaeological sites because none are present on the LF and MAF sites and the presence of any unknown sites is unlikely due to previous site disturbance that occurred during construction of the facilities. However, in the event that archaeological materials are unexpectedly encountered, dismantlement activity in the immediate area would cease, the find would be protected from further disturbance, and the Malmstrom AFB cultural resources manager and Montana SHPO would be notified to determine if the find is National Register-eligible. No significant impacts to prehistoric and historic archaeological resources are expected.

Historic Buildings and Structures. The 564 MS Minuteman III missile system has been determined to be eligible for inclusion on the National Register under Criterion A for its association with significant U.S. military missile activities and paradigms during the period from 1962 to 1989 and Criterion C for its technological design and function. The Montana SHPO has concurred with the Air Force determination of eligibility. The Air Force and Montana SHPO have agreed that the artwork located within the 564 MS MAFs and LFs is of historic importance and has been preserved through photographic documentation.

An MOA between the Air Force, Montana SHPO, and Advisory Council has been developed to document the accepted measures (i.e., HABS/HAER recordation, creation of a 564 MS brochure, the preservation of an active LF [Alpha-06], and MAF [Alpha-01], and displays at the Malmstrom AFB Museum) for the inactivation of the 564 MS that would reduce impacts to less than significant (Malmstrom AFB, 2007b). All such measures outlined in the MOA have been

completed. Therefore, insignificant impacts to historic buildings and structures are anticipated.

Traditional Cultural Resources. The Air Force conducted consultations with representatives of the Blackfeet Nation, Flathead Indian Nation, and Rocky Boys Reservation (Chippewa-Cree). No interest in the LF or MAF locations within the former 564 MS deployment area was expressed. There are no known traditional cultural resources at the LFs or MAFs; therefore, no significant impacts to traditional cultural resources are expected.

4.9.1.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to prehistoric and historic archaeological resources, historic buildings and structures, and traditional cultural resources would be the same as those described under the Explosive Implosion Alternative. No significant impacts are anticipated.

4.9.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. The Air Force would continue to maintain the LFs and MAFs in caretaker status; therefore, no significant impacts to cultural resources are expected.

Mitigation Measures

Because mitigation measures outlined in the MOA have been completed, insignificant impacts to cultural resources are anticipated and no additional mitigation measures would be required.

4.9.2 F.E. Warren AFB

4.9.2.1 Explosive Implosion Alternative.

Prehistoric and Historic Archaeological Resources. Dismantlement activities would not be expected to affect any prehistoric or historic archaeological resources. Ground-disturbing activities at LF and MAF sites would not affect any known archaeological sites because none are present on the LF and MAF sites and the presence of any unknown sites is unlikely due to previous site disturbance that occurred during construction of the facilities. However, in the event that archaeological materials are unexpectedly encountered, dismantlement activity in the immediate area would cease, the find would be protected from further disturbance, and the F.E. Warren AFB cultural resources manager and Wyoming SHPO would be notified to determine if the find is National Register-eligible. No significant impacts to prehistoric and historic archaeological resources are expected.

Historic Buildings and Structures. The 400 MS Peacekeeper missile system has been determined to be eligible for inclusion on the National Register due to its significance in the Cold War. A PA between the Air Force and Wyoming

SHPO has been developed to document the accepted measures (F.E. Warren AFB, 2013). Stipulations of the PA include:

- Preserve and maintain Building 486 (designated as Launch Facility Trainer U-02). U-02 shall be open to the public at regularly scheduled times as an interpretive display operated by the F.E. Warren Heritage and ICBM Museum Program. It shall also be open to the public during Fort D.A. Russell Days (The first weekend of Cheyenne Frontier Days) and by appointment in accordance with procedures established by the F.E. Warren ICBM and Heritage Museum.

- Provide to the Wyoming SHPO as-built drawings of the Peacekeeper LF and any other pertinent historic documentation.

- Retain ownership and responsibility for the preservation of the five (5) existing Peacekeeper MAFs until mitigation strategies for the disposition of these sites can be determined through an amendment of the PA. Possible future mitigations include transfer of MAF Q-01 to the State of Wyoming for use as a museum and interpretive facility.

- Complete an HSR for Q-01. The HSR shall be completed in accordance with the National Park Service's Preservation Brief 43: The Preparation and Use of Historic Structures Reports.

Completing the stipulations of the PA, including preparation of the HSR and transfer of MAF Q-1 would reduce impacts to less than significant.

Traditional Cultural Resources. The Air Force conducted consultations with representatives of the Arapaho Tribe of the Wind River Reservation, Cheyenne and Arapaho Tribes of Oklahoma, Cheyenne River Sioux Tribe, Crow Creek Sioux Tribal Council, Fort Peck Assiniboine and Sioux Tribe, Lower Brule Sioux Tribal Council, Northern Cheyenne, Oglala Sioux Tribe, Rosebud Sioux Tribe, Santee Sioux Nation, and Standing Rock Sioux Tribe. No interest in the LF or MAF locations within the former 400 MS deployment area was expressed. There are no known traditional cultural resources at the LFs or MAFs; therefore, no significant impacts to traditional cultural resources are expected.

4.9.2.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to prehistoric and historic archaeological resources, historic buildings and structures, and traditional cultural resources would be the same as those described under the Explosive Implosion Alternative. With implementation of stipulations in the PA, potential effects of dismantlement within the former 400 MS would be reduced to less than significant.

4.9.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. The Air Force would continue to maintain the LFs and MAFs in caretaker status; therefore, no significant impacts to cultural resources are expected.

Mitigation Measures

To reduce potential effects of dismantlement within the former 400 MS to less than significant, the Air Force would adhere to stipulations in the PA (outlined above) including preparation of an HSR for MAF Q-1 and supporting the transfer of MAF Q-1 to the State of Wyoming State Parks and Cultural Resources to be developed by state and local agencies as an interpretive center/museum for Peacekeeper operations in Wyoming.

4.9.3 Vandenberg AFB

4.9.3.1 Explosive Implosion Alternative.

Prehistoric and Historic Archaeological Resources. Dismantlement activities would not be expected to affect any prehistoric or historic archaeological resources. When the LFs at Vandenberg AFB were constructed, the sites were heavily disturbed and backfilled with soil from the immediate vicinity. However, the four LFs at Vandenberg AFB were constructed within or adjacent to archeological sites. The construction of LF-05 partially destroyed prehistoric archeological site CA-SBA-1853. The remains of the site have been evaluated and determined to be eligible for listing in the National Register through consultation with the California SHPO. The construction of LF-06 impacted two prehistoric archeological sites (CA-SBA-2129 and CA-SBA-1866), located adjacent to the LF. National Register eligibility of both sites remains undetermined. LF-07 was constructed within the boundaries of archeological site CA-SBA-228. This site has not been evaluated for eligibility. LF-25 was not constructed within or adjacent to an archeological site. Although a known prehistoric archeological site (CA-SBA-3480) is located approximately 50 meters (165 feet) from the LF. Dismantlement activities would occur in the immediate vicinity of the launch tube and within the asphalt-paved area. Furthermore, no asphalt is planned for removal. However, in the event that archaeological materials are unexpectedly encountered, dismantlement activity in the immediate area would cease, the find would be protected from further disturbance, and the Vandenberg AFB cultural resources manager and California SHPO would be notified to determine if the find is National Register-eligible. Therefore, no significant impacts to prehistoric or historic archaeological resources are anticipated.

Historic Buildings and Structures. LF-05, LF-06, and LF-07 have been determined to be eligible for inclusion on the National Register under Cold War Criterion A and/or Cold War Criterion D. After the last launch in 1976, the Air Force abandoned and stripped LF-25 of useful equipment. Consequently, LF-25

no longer retains sufficient physical integrity to adequately convey a sense of its historic function. Therefore, LF-25 does not meet the National Register integrity requirement and is not eligible for listing on the National Register. Vandenberg AFB currently maintains a PA for management of historic Cold War resources. The purpose of the PA is to streamline management activities for Vandenberg AFB historic Cold War properties including refurbishment of the LFs after launch activities.

The Vandenberg AFB cultural resources manager determined that the adverse effect of dismantling LF-05, LF-06, and LF-07 have been, in part, already mitigated by previously completed documentation efforts. The LFs at Vandenberg AFB are the same as those documented in other parts of the United States and at Vandenberg AFB where it has been determined that such documentation is appropriate and adequate to reduce potential effects of dismantlement to less than significant. An MOA between the Air Force and California SHPO has been developed to document the accepted additional efforts that would resolve the adverse effects of the dismantlement action (Vandenberg AFB, 2013). Additional efforts will include 1) preparation of California DPR 523 forms for LF-05, LF-06, and LF-07 based on existing architectural and engineering descriptions of the facilities, available plans, diagrams, and drawings. This recordation effort would include photographic documentation of the three LFs prior to demolition and photos of the demolition process using high-resolution digital cameras, and 2) preparation of a brochure based on the DPR summary forms, photography, and other applicable information. With implementation of the measures outlined above, the adverse effect of dismantling LF-05, LF-06, and LF-07 would be reduced to less than significant.

Traditional Cultural Resources. The LFs are within or adjacent to known archaeological sites. The Air Force conducted consultations with representatives of the Santa Ynez Band of the Chumash Indians. No interest in the LF locations was expressed; however, per the request of the Chumash, and as a standard operating procedure, a Native American monitor will be present during ground disturbing activities. Because dismantlement activities would occur within the paved area of the LFs, no significant impacts to traditional cultural resources are anticipated.

4.9.3.2 Backfill Alternative.

Under the Backfill Alternative, potential impacts to prehistoric and historic archaeological resources, historic buildings and structures, and traditional cultural resources would be the same as those described under the Explosive Implosion Alternative. With implementation of measures stipulated in the MOA, the adverse effect of dismantling LF-05, LF-06, and LF-07 would be reduced to less than significant.

4.9.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. The Air Force would continue to maintain the LFs and MAFs in caretaker status; therefore, no significant impacts to cultural resources are expected.

Mitigation Measures

In compliance with the MOA, efforts that would be implemented at Vandenberg AFB to reduce adverse effects to less than significant include preparation of California DPR 523 forms for LF-05, LF-06, and LF-07 based on existing architectural and engineering descriptions of the facilities, available plans, diagrams, and drawings, and preparation of a brochure based on the DPR summary forms, photography, and other applicable information.

4.10 ENVIRONMENTAL JUSTICE

In order to determine whether disproportionately high and adverse human health and environmental impacts to low-income, minority, or youth populations would result from the Proposed Action or No-Action Alternative, census data for each county were analyzed to determine if these counties contain a disproportionate percentage of low-income, minority, and/or youth residents. This is calculated by comparing the percentage of low-income residents, the percentage of minority residents, and the percentage of youth residents in each county with the States of Montana, Wyoming, and California percentages (see Tables 3.11-1 to 3.11-6 and Figures 3.11-1 and 3.11-2). The counties were analyzed to determine whether they underlie impact footprints for resources analyzed in this EA. For the environmental justice analysis, impact footprints are defined as the area of projected adverse impacts for a resource based on environmental analysis of a proposed activity. The results of the environmental justice analysis are discussed below.

4.10.1 Malmstrom AFB

4.10.1.1 Explosive Implosion Alternative.

Based on the analysis conducted for this EA, it was determined that activities associated with the Explosive Implosion Alternative would not have a significant impact on any of the resources analyzed in this EA. In addition, impacts from dismantlement activities, with the exception of air quality, would generally be confined to the project site and would not result in an adverse impact to adjacent areas. Potential impact to air quality would occur throughout the area; therefore, disproportionate high and adverse air quality impacts to minority, low-income, and youth populations would not be expected.

4.10.1.2 Backfill Alternative.

Based on the analysis conducted for this EA, it was determined that activities associated with this alternative would not have a significant impact on any of the

resources analyzed in this EA. Therefore no disproportionately high and adverse impacts to minority, low-income, or youth populations would be expected.

4.10.1.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. Therefore no disproportionately high and adverse impacts to minority, low-income, or youth populations would be expected.

4.10.2 F.E. Warren AFB

4.10.2.1 Explosive Implosion Alternative.

Based on the analysis conducted for this EA, it was determined that activities associated with the Explosive Implosion Alternative would not have a significant impact on any of the resources analyzed in this EA. In addition, impacts from dismantlement activities, with the exception of air quality, would generally be confined to the project site and would not result in an adverse impact to adjacent areas. Potential impact to air quality would occur throughout the area; therefore, disproportionate high and adverse air quality impacts to minority, low-income, and youth populations would not be expected.

4.10.2.2 Backfill Alternative.

Based on the analysis conducted for this EA, it was determined that activities associated with this alternative would not have a significant impact on any of the resources analyzed in this EA. Therefore no disproportionately high and adverse impacts to minority, low-income, or youth populations would be expected.

4.10.2.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. Therefore no disproportionately high and adverse impacts to minority, low-income, or youth populations would be expected.

4.10.3 Vandenberg AFB

4.10.3.1 Explosive Implosion Alternative.

Based on the analysis conducted for this EA, it was determined that activities associated with the Explosive Implosion Alternative would not have a significant impact on any of the resources analyzed in this EA. In addition, impacts from dismantlement activities, with the exception of air quality, would generally be confined to the project site on-base and would not result in an adverse impact to adjacent areas. Potential impact to air quality would occur throughout the area; therefore, disproportionate high and adverse air quality impacts to minority, low-income, and youth populations would not be expected.

4.10.3.2 Backfill Alternative.

Based on the analysis conducted for this EA, it was determined that activities associated with this alternative would not have a significant impact on any of the resources analyzed in this EA. Therefore no disproportionately high and adverse impacts to minority, low-income, or youth populations would be expected.

4.10.3.3 No-Action Alternative.

Under the No-Action Alternative, dismantlement activities would not be implemented. Therefore no disproportionately high and adverse impacts to minority, low-income, or youth populations would be expected.

4.11 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

The only unavoidable adverse effect from dismantlement activities identified is the dismantlement of Cold War-eligible resources within the former 400 MS and at Vandenberg AFB. To reduce potential effects of dismantlement within the former 400 MS to less than significant, a PA has been prepared that stipulates the Air Force will prepare an HSR for MAF Q-1 and support the transfer of MAF Q-1 to the State of Wyoming State Parks and Cultural Resources to be developed by state and local agencies as an interpretive center/museum for Peacekeeper operations in Wyoming. Efforts stipulated in the MOA that would be implemented at Vandenberg AFB to reduce adverse effects to less than significant include preparation of California DPR 523 forms for LF-05, LF-06, and LF-07 based on existing architectural and engineering descriptions of the facilities, available plans, diagrams, and drawings, and preparation of a brochure based on the DPR summary forms, photography, and other applicable information.

In addition, Table 2-3 provides the Air Forces' proposed best management practices, environmental protection measures, and other minimization measures that would be implemented to eliminate or reduce the impacts of non-significant adverse effects. Additional measures and/or monitoring may be identified during further regulatory consultation.

4.12 COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, STATE, REGIONAL, AND LOCAL LAND USE PLANS AND POLICIES

Compatibility with federal, state, and local land use plans and policies has not been evaluated and is beyond the scope of this EA as no change in land ownership or management is proposed. Following dismantlement and grading activities at LF and MAF locations, disposition would be in accordance with GSA requirements. The disposal process is covered in P.L. 100-108, Section 235 (10 U.S.C. Section 9781). Future use of the LF and MAF property is speculative and is beyond the scope of analysis in this EA. However, after site grading activities are completed, the LF and MAF property would continue to be compatible with surrounding land uses.

With regard to aggregate/gravel mining activities in support of acquiring fill material for the dismantlement effort, local governments have jurisdiction over zoning and land use planning and can place additional restrictions on mining operations as appropriate. Permits to mine aggregate and gravel contain bond requirements to ensure reclamation of the site occurs once mining is completed and future use of the area is compatible with surrounding uses.

4.13 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The Proposed Action and No-Action Alternative would not affect the long-term productivity of the environment because no significant environmental impacts are anticipated, provided appropriate standard construction practices identified in this EA are implemented. Although small quantities of fuel would be required for operation of construction equipment, no significant effects would result. Abundant supplies of aggregate and gravel are available in the region where silo dismantlement activities would occur; therefore, natural resources would not be significantly depleted.

4.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementation of the Proposed Action would result in the irreversible or irretrievable commitment of resources. An irreversible and irretrievable loss of United States nuclear deterrence capability would result from the dismantlement of the LFs, which are unique and complex missile support structures that cannot be replaced. Use of gravel/earth to fill the LFs, LFSB, and access to the LCC would result in the irretrievable commitment of these materials. In addition, dismantlement and site grading activities would result in the irretrievable commitment of small quantities of fuel that would be required for operation of construction equipment.

4.15 CUMULATIVE ENVIRONMENTAL CONSEQUENCES

Cumulative impacts result from “the incremental impact of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time” (Council on Environmental Quality, 1978).

Future actions in the vicinity of the LFs and MAFs include continued agricultural activities, mining activities, and oil exploration (in Montana and Wyoming), and continuation of launch activities at adjacent LFs on Vandenberg AFB. These activities are considered part of the baseline conditions and do not currently impact the sites. Due to the short-term dismantlement effort and dispersed nature of the missile fields, dismantlement activities are not anticipated to result in cumulative environmental impacts within the former 400 MS, former 564 MS, and Vandenberg AFB areas in association with other ongoing activities.

A planned wind energy development within the former 400 MS is anticipated to occur after dismantlement activities are completed and is not likely to result in cumulative environmental impacts. However, an economic impact to local land owners (in the form of lost royalties from land leases with the wind energy developer) could occur if delays in relinquishing easement agreements for the 1,200-foot safety area surrounding the LFs are delayed. The Air Force intends to evaluate and abide by the existing lease agreements and would expedite relinquishing the easement agreements at the earliest date practicable to minimize potential economic impact to local land owners.

No other reasonably foreseeable actions have been identified within the former 564 MS in Montana, the former 400 MS in Wyoming, or the LF locations at Vandenberg AFB that could be considered as contributing to a potential cumulative impact on the environment, along with impacts associated with implementation of dismantlement activities. The potential impacts from the Proposed Action are short term and minor, and are not expected to contribute to cumulative environmental impacts.

5.0 CONSULTATION AND COORDINATION

The federal, state, and DOD agencies/organizations/individuals contacted during preparation of this EA are listed below:

Federal

National Marine Fisheries Service
U.S. EPA, Region 8
U.S. EPA, Region 9
U.S. Fish and Wildlife Service

State

California EPA/Department of Toxic Substances Control
California State Historic Preservation Officer
Montana Department of Environmental Quality
Montana Department of Natural Resources and Conservation
Montana Fish, Wildlife, and Parks
Montana State Historic Preservation Officer
Wyoming Department of Environmental Quality
Wyoming State Historic Preservation Officer

Department of Defense

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AFGSC/A7AN	Col Mark Sloan
AFGSC/A7A	Mr. Russell Weniger
HQ AFCEC/CZN	Mr. Charles Brown
HQ AFCEC/CZN	Mr. Dale Clark
HQ AFCEC/CZN	Ms. Toni Ristau
HQ AFSPC/A4/7P	Ms. Lynne Neuman
30 CES/CEAOP	Mr. Andrew Edwards
30 SW/XPE	Mr. Ed Coker
30 SW/XPE	Mr. Randy Vigil
90 CES/CEA	Mr. Travis Beckwith
90 MW/CCT	Mr. Rex Ellis
90 MW/CCT	Mr. Martin Whalen
341 CES/CEAO	Mr. Chris Murphy
341 MW/CCT	Mr. Mike Bailey
341 MW/CCT	Mr. Rick Bialczak

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511 Hart Senate Office Building
Washington, DC 20510-2604

U.S. Senator Max Baucus
c/o Bonnie Keller
113 3rd Street North
Great Falls, MT 59401

U.S. Senator Jon Tester
724 Hart Senate Office Building
Washington, DC 20510-2604

U.S. Senator Jon Tester
c/o Cheryl Ulmer
119 1st Avenue North
Great Falls, MT 59401

U.S. Rep Dennis R. "Denny" Rehberg
2448 Rayburn House Office Building
Washington, DC 20515

U.S. Rep Dennis R. "Denny" Rehberg
c/o Michael Waite
105 Smelter Avenue NE
Great Falls, MT 59404

Wyoming

U.S. Senator Michael Enzi
379A Senate Russell Office Building
Washington, DC 20510

U.S. Senator Michael Enzi
c/o Deb McCann
2120 Capitol Avenue #2207
Cheyenne, WY 82001

U.S. Senator John Barrasso
307 Dirksen Senate Office Building
Washington, DC 20510

U.S. Senator John Barrasso
c/o Daniel R. Gallegos
PO Box 22201
Casper, WY 82602

U.S. Rep Cynthia Lummis
113 Cannon House Office Building
Washington, DC 20515

U.S. Rep Cynthia Lummis
c/o Johnnie Burton
2120 Capitol Avenue #8005
Cheyenne, WY 82001

Federal Agencies

U.S. Environmental Protection Agency, Region 8
Director, Office of Federal Activities
999 18th Street, Suite 200
Denver, CO 80202-2466

U.S. Environmental Protection Agency, Region 9
Director, Office of Federal Activities
75 Hawthorne Street
San Francisco, CA 94105

U.S. Fish and Wildlife Service
Ventura Office
2493 Portola Road, Suite B
Ventura, CA 93003

U.S. Fish and Wildlife Service
Montana Field Office
100 N. Park, Suite 320
Helena, MT 59601

U.S. Fish and Wildlife Service
Wyoming Field Office
5353 Yellowstone Road, Suite 308A
Cheyenne, WY 82009

State Agencies

California

California Coastal Commission
South Central Coast District Office
89 South California Street, Suite 200
Ventura, CA 93001-2801

California Department of Fish and Game
South Coast Region
P.O. Box 1797
Ojai, CA 93025

California Environmental Protection Agency
Department of Toxic Substances Control
Berkley Regional Office
700 Heinz Avenue, Suite 100
Berkley, CA 94710-2721

Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401-5427

NOAA Marine Fisheries Service
Southwest Regional Office
501 West Ocean Boulevard
Long Beach, CA 90802

Office of Historic Preservation
California State Historic Preservation Officer
1416 9th Street, Room 1442-7
Sacramento, CA 95814

State of California Clearinghouse
Governor's Office
1400 Tenth Street, Room 121
Sacramento, CA 95814

Montana

Montana Department of Natural Resources and Conservation
1625 Eleventh Avenue
Helena, MT 59620-1601

Montana Fish, Wildlife, and Parks
Region 4 Office
4600 Giant Springs Road
Great Falls, MT 59405

State Historic Preservation Officer
Attn: Dr. Mark Baumler
1410 8th Avenue
P.O. Box 201202
Helena, MT 59620-1202

Wyoming

Wyoming Department of Environmental Quality
122 West 25th Street, Herschler Building
Cheyenne, WY 82002

Wyoming Division of State Parks and Historic Sites
Barrett Building - 4th Floor 2301 Central Avenue
Cheyenne, WY 82002

Wyoming Office of State Lands and Investments
122 W. 25th, 3rd Floor West
Cheyenne, WY 82002

Wyoming Game and Fish Department
5400 Bishop Boulevard
Cheyenne, WY 82006

Wyoming State Historic Preservation Officer
2301 Central Avenue
Barrett Building, Third Floor
Cheyenne, Wyoming 82002

Local Agencies

California

Santa Ynez Band of Chumash Indians
P.O. Box 517
Santa Ynez, CA 93460

Montana

Blackfeet Tribe
P.O. Box 850
Browning, MT 59417

Chippewa-Cree Tribe
Rocky Boy Route, Box 544
Box Elder, MT 59521

Confederated Salish & Kootenai Tribes
51383 Highway 93 North
P.O. Box 278
Pablo, MT 59855

Wyoming

Arapaho Tribe of the Wind River Reservation
Arapaho Business Committee
P.O. Box 396
Fort Washakie, WY 82514

Cheyenne and Arapaho Tribes of Oklahoma
P.O. Box 38
100 Red Moon Circle
Concho, OK 73022

Cheyenne River Sioux Tribe
Cultural Preservation Office
HVJ Cultural Center
P.O. Box 590
Eagle Butte, SD 57625

Crow Creek Sioux Tribal Council
P.O. Box 50
Fort Thompson, SD 57339

Fort Peck Assiniboine and Sioux Tribe
Cultural resources Department
P.O. Box 1027
Poplar, MT 59255

Lower Brule Sioux Tribal Council
187 Oyate Circle
Lower Brule, SD 57548

Northern Cheyenne Cultural Commission
Northern Cheyenne Tribe
P.O. Box 128
Lame Deer, MT 59043

Oglala Sioux Tribe
Oglala Lakota College Archives
P.O. Box 490
Kyle, SD 57752

Rosebud Sioux Tribe
Lakota Archive and Historical Research Center
Sinte Gleska University
P.O. Box 490
Antelope Lake Campus
Rosebud, SD 57570

Santee Sioux Nation
108 Spirit Lake Avenue, West
Niobrara, NE 68760

Sinte Gleska University
Sicangu Heritage Center
P.O. Box 675
Antelope Lake Campus
Mission, SD 57555-0675

Standing Rock Sioux Tribe
Repatriation Committee
P.O. Box D
Fort Yates, ND 58538

Department of Defense

U.S. Department of the Air Force
AFGSC/A7A
841 Fairchild Avenue
Barksdale AFB, LA 71110

Department of the Air Force
HQ AFCEC/CZN
3515 S. General McMullen, Building 171
San Antonio, TX 78236-2018

Department of the Air Force
HQ AFSPC/A4/7P
150 Vandenberg Street, Suite 1105
Peterson AFB, CO 80914-4150

Department of the Air Force
30 CES/CEAOP
1028 Iceland Avenue
Vandenberg AFB, CA 93437-6010

Department of the Air Force
90 CES/CEA
300 Vesle Drive
Cheyenne, WY 82005-2793

Department of the Air Force
341 CES/CEAO
39 78th Street North
Building 470
Malmstrom AFB, MT 59402-7536

Libraries

California

Lompoc Library
501 E. North Avenue
Lompoc, CA 93436

Santa Barbara Public Library
40 East Anapamu Street
Santa Barbara, CA 93101

Santa Maria Public Library
420 South Broadway Avenue
Santa Maria, CA 93454

UC Santa Barbara Library
Government Publications
Santa Barbara, CA 93106-9010

Montana

Great Falls Public Library
301 2nd Avenue North
Great Falls, MT 59401-2593

Choteau Public Library
17 Main Avenue North
Choteau, MT 59422

Conrad Public Library
15 Fourth Avenue SW
Conrad, MT 59425

Dutton Public Library
22 Main Street West
Dutton, MT 59433

Toole County Library
229 Second Avenue South
Shelby, MT 59474

Wyoming

County of Goshen Public Library
2001 East A Street
Torrington, WY 82240

Laramie County Central Library
2200 Pioneer Avenue
Cheyenne, WY 82001

Platte County Public Library
Main Library
904 9th Street
Wheatland, WY 82201

Platte County Public Library
Chugwater Branch
301 2nd Street
Chugwater, WY 82210

Other Organizations/Individuals

Dennis Apel

APPENDIX A

AIR EMISSIONS ANALYSIS

A.1 Introduction

This appendix provides the analysis of criteria pollutant emissions and greenhouse gases in terms of Carbon Dioxide (CO_2) emissions.

A.2 Emission Analysis

The 1990 amendments to the Clean Air Act (CAA) require federal agencies to ensure that their actions conform to the appropriate State Implementation Plan (SIP) in a nonattainment area. The SIP is a plan that provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS), and it includes emission limitations and control measures to attain and maintain the NAAQS. Conformity to a SIP, as defined in the CAA, means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The federal agency responsible for an action is required to determine if its action conforms to the applicable SIP.

The U.S. Environmental Protection Agency (EPA) has developed two sets of conformity regulations, and federal actions are appropriately differentiated into transportation projects and non-transportation-related projects:

- Transportation projects are governed by the "transportation conformity" regulations (40 Code of Federal Regulations [CFR] Parts 51 and 93), which became effective on December 27, 1993 and were revised on August 15, 1997.

- Non-transportation projects are governed by the "general conformity" regulations (40 CFR Parts 6, 51 and 93) described in the final rule for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* that was published in the *Federal Register* on November 30, 1993. The General Conformity Rule (GCR) became effective January 31, 1994 and was updated on March 24, 2010.

Since the Proposed Action is a non-transportation project, only the GCR may apply according to the location for applicable project sites. The Proposed Action would occur at Malmstrom Air Force Base (AFB) in Montana, F.E. Warren AFB in Wyoming, and Vandenberg AFB in California, which are currently designated attainment for criteria pollutants.

Therefore, the proposed dismantlement action is not subject to the GCR and the GCR applicability analysis is not required. Although the GCR does not apply, for National Environmental Policy Act (NEPA) disclosure purposes, criteria pollutant emissions were analyzed in a similar way as required by the GCR.

De Minimis Emissions Levels

According to the GCR, threshold (*de minimis*) rates of emissions were established for those federal actions with the potential to have significant air quality impacts. Table A-1 summarizes these thresholds.

Pursuant to the GCR, reasonably foreseeable emissions (both direct and indirect) associated with the proposed construction activities, under the Proposed Action were quantified and compared to the annual *de minimis* levels to determine potential emissions impacts.

The analysis examines the impacts of the direct and indirect net emissions from mobile and stationary sources. Direct emissions are emissions of a criteria pollutant or its precursors that are caused or initiated by a federal action and occur at the same time and place as the action. Indirect emissions, occurring later in time and/or further removed in distance from the action itself, must be included in the determination if both of the following apply:

Table A-1. De Minimis Threshold in Nonattainment Areas

Pollutant	Degree of nonattainment	De Minimis Level (tons/year)
Ozone (VOCs and NO_x)	Serious	50
	Severe	25
	Extreme	10
	Marginal and Moderate (outside an ozone transport region)	100
	Marginal and Moderate (inside an ozone transport region)	50
CO	All	100
PM_{10}	Moderate	100
	Serious	70
$PM_{2.5}$	Nonattainment	100
SO_2 or NO_2	All	100
Lead	All	25

CO = carbon monoxide
NO_2 = nitrogen dioxide
NO_x = nitrogen oxides
SO_2 = sulfur dioxide
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
VOC = volatile organic compound

- The federal agency can practicably control the emissions and has continuing program responsibility to maintain control.
- The emissions caused by the federal action are reasonably foreseeable.

Increased direct and indirect emissions from the dismantlement activities would result from the following potential activities:

- Use of diesel and gas-powered construction equipment
- Movement of trucks containing construction and removal materials on site
- Movement of trucks for fill material being transported to the LFs and MAFs
- Commuting of construction workers.

Construction Activity Data

A construction activity estimate was made to identify equipment, material and manpower requirements for the dismantlement of missile launch facilities (LFs) and missile alert facilities (MAFs) associated with the installations. Estimates as to construction crew and equipment requirements and productivity are based on data presented in:

- "2003 RSMeans Facilities Construction Cost Data", R.S. Means Co., Inc., 2002
- "2011 RSMeans Facilities Construction Cost Data", R.S. Means Co., Inc., 2010.

The assumptions and calculations presented below are based on the proposed dismantlement alternatives described in this EA. The Proposed Action would involve dismantlement of 104 LFs (50 each at Malmstrom AFB in Montana and F.E. Warren AFB in Wyoming and 4 at Vandenberg AFB in California) and 10 MAFs (5 each at Malmstrom and F.E. Warren AFBs).

Two different alternatives for dismantlement of the LFs are proposed:

- **Explosive Implosion Alternative –** Under this alternative, the silo door would be removed, dismantled, or destroyed, and the silo headworks and the silo would be destroyed by explosives to a depth of no less than 20 feet. The silo would be completely filled with the resulting debris and earth/gravel, and an estimated 760 cubic yards (CY) of additional earth/gravel fill would be imported to each location to backfill the remaining volume of each LF. A cap with a plastic liner would be placed above the dismantled LF and the site graded to match the surrounding topography, (except for the 4 LFs at Vandenberg AFB, where the sites would be paved following demolition). In addition, at Vandenberg AFB, due to the proximity of foundations to two of the LFs, a 3,000 square foot (SF) movable shelter building and a 4,000 SF storage building would need to be deconstructed prior to explosive implosion.

- **Backfill Alternative –** Under this alternative, the silo door would be removed, dismantled, or destroyed and the LF completely filled with the resulting debris and an estimated 865 CY of earth/gravel fill imported to each site. A cap with a plastic liner would be placed above the dismantled LF and the site graded to match the surrounding topography (except for the 4 LFs at Vandenberg AFB, where the sites would be paved following demolition).

The dismantlement of the MAFs at Malmstrom and F.E. Warren AFBs would be done in an identical manner at both locations (except that at F.E. Warren AFB the demolition of sewage lagoons at each MAF is also included as part of the proposed work):

- **MAF Abandonment –** At each MAF, two blast doors would be welded shut, platforms, a structural staircase, and the elevator and associated appurtenances would be removed, the vestibule and elevator shaft would be filled with compacted fill, air intake and exhaust ducts would be filled, and the elevator shaft and air ducts would be capped with reinforced concrete.

- **Lagoon Demolition –** At F.E. Warren AFB, liquid and sludge would be removed from the sewage lagoons at each of the five MAFs being abandoned, the lagoons and surrounding berms would be leveled, and the site would be stabilized and seeded.

The work associated with each of these components of the proposed work is as follows:

Explosive Implosion Alternative – Calls for the explosive implosion of the top 20 feet of each LF, use of resulting rubble as fill, and the importation of additional material to complete filling of the abandoned LFs. The headworks of each LF are approximately 33 feet deep and 25 feet wide. The launch tube extends to a depth of about 90 feet below ground (i.e., approximately 60 feet below the headworks) and is 12 feet in diameter. The construction activity components considered in the estimate under this alternative include:

- Silo door removal
- Drilling and blasting
- Fill excavation
- Fill transportation
- Fill placement
- Cap placement and grading (F.E. Warren and Malmstrom AFB)
- Cap placement and paving (Vandenberg AFB)
- Building deconstruction (Vandenberg AFB only).

Backfill Alternative – Calls for the importation of material to fill the abandoned LFs. The activities considered in the estimate under this alternative include:

- Silo door removal
- Fill excavation
- Fill transportation
- Fill placement
- Cap placement and grading (F.E. Warren and Malmstrom AFB)
- Cap placement and paving (Vandenberg AFB).

MAF Abandonment – At each MAF, two blast doors would be welded shut, platforms, a structural staircase, and the elevator and associated appurtenances would be removed, the vestibule and elevator shaft would be filled with compacted fill, air intake and exhaust ducts would be filled, and the elevator shaft and air ducts would be capped with reinforced concrete. Specific activity components considered include:

- Blast door closures
- Demolition
- Fill placement – 165 CY per MAF was assumed based on sketches in the draft EA
- Concrete caps.

Lagoon Demolition – At F.E. Warren AFB, liquid and sludge would be removed from the sewage lagoons at each of the five MAFs being abandoned, the lagoons and surrounding berms would be leveled, and the site would be stabilized and seeded.

- Capacity of swage lagoons - assumed that each one will require 10 tanker-truck trips to remove contents
- Berm demolition
- Grading
- Seeding.

Equipment Summary

All equipment and its operational hours, and number of crew associated with above construction items were determined first. Each piece of equipment was assumed to be diesel powered unless otherwise noted. Each piece of equipment was assumed to be operated continuously for six hours during each working day. Pieces of equipment to be used for the construction and demolition activities include, but are not limited to:

- Asphalt paver
- Backhoe loaders
- Compressors
- Cranes
- Crawler type-drill
- Dozer
- Excavators
- Front end loaders
- Gas engine vibrators

- Gas welding machines
- Rollers
- Dump trucks.

Equipment Emission Estimate

Estimates of construction equipment emissions were based on the estimated hours of usage and emission factors for each motorized source. Emission factors and engine load factors related to heavy-duty diesel equipment were based on U.S. EPA provided default NONROAD emission factors (U.S. EPA, December 31, 2008).

Emission factors (in grams of pollutant per hour per horsepower) were multiplied by the estimated running time and equipment associated average horsepower to calculate the total grams of pollutant from each piece of equipment. Average horsepower values were obtained from default NONROAD emission factors worksheet (U.S. EPA, December 31, 2008). Finally, the total grams of pollutant were converted to tons of pollutant.

The U.S. EPA recommends the following formula to calculate hourly emissions from nonroad engine sources including cranes, backhoes, etc.:

$$M_i = N \times HP \times LF \times EF_i$$

where:

M_i = mass of emissions of *i*th pollutants during inventory period;

N = source population (units);

HP = average rated horsepower;

LF = typical load factor; and

EF_i = average emissions of *i*th pollutant per unit of use (e.g., grams per horsepower-hour).

Estimated emissions from operation of on-site construction equipment are presented in Table A-2. A sample calculation for NO_x emissions from a 40-ton crane engine usage for Explosive Implosion Alternative at Malmstrom AFB follows:

Operational Hours	=	330 hours (1 crane x 5 days/week x 11 weeks x 6 hr/day)
Operational Emissions	=	330 hours x 231 hp x 43% x 5.14 grams/hp-hr
	=	168,483 grams
	=	0.19 tons (see Table A-2)

The calculated construction equipment emissions at each installation under the two proposed alternatives are summarized in Table A-2 through Table A-7.

Vehicle Emission Estimate

Truck and commuting vehicle operations would result in indirect emissions. Motor vehicle operations within the project site for which each installation has control over are assumed and summarized as follows:

- Pickup, dump, and other construction-related trucks would travel at an average speed of 25 miles per hour (mph) on site, for a total estimated run time of two hours per working day including truck running time for transporting materials;
- Each worker's commuter vehicle would require a 20-minute round trip to commute to/from the site at an average speed of 25 mph;
- Each fill material truck would travel from off-site borrow areas to and from each LF or MAF for an approximately 30-mile round trip; and
- 40 truck trips are assumed for each LF and 9 trips for each MAF under the Explosive Implosion Alternative and 45 trips for each LF and 9 trips for each MAF under the Backfill Alternative.

Within F.E. Warren and Malmstrom AFBs, emission factors for motor vehicles were calculated for both trucks (including dump, delivery, tractor, and tractor trucks that were modeled as heavy-duty diesel vehicles [HDDV]) and commuter vehicles (modeled as light-duty gasoline vehicles [LDGV]) using EPA Mobile 6.2 mobile source emission factor model associated with model default input parameters. The modeled emission factors were then multiplied by the vehicle operational hours to determine motor vehicle emissions as shown in Table A-8 through A-11.

With Vandenberg AFB, emission factors for motor vehicles were calculated for both trucks and commuter vehicles using the California Air Resources Board (CARB) EMFAC2007 mobile source emission factor model. Statewide default input parameters were used. The modeled emission factors were then multiplied by the vehicle operational hours to determine motor vehicle emissions (Tables A-12 and A-13).

Total Construction Emissions

The total construction period emissions with potential to be emitted within each installation are summarized in Table A-14 through Table A-19.

Table A-2. Construction Equipment Emissions under Explosive Implosion Alternative at Malmstrom AFB

Equipment Type/Activity	Number of Units	Weeks	Hours	Horsepower (hp)	Load Factor (%)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Demolition and Construction																			
Crane, hydraulic 33 ton	1	3	90	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.00	0.01	0.01	0.00	0.00	0.00	1.52
Crane, 40-tons	1	11	330	231	43	0.35	5.14	1.30	0.24	0.25	0.11	532.78	0.01	0.19	0.05	0.01	0.01	0.00	19.23
Compressor, 250 cfm	1	2	60	90	43	0.32	4.01	2.63	0.37	0.38	0.13	589.94	0.00	0.01	0.01	0.00	0.00	0.00	1.51
Compressor, 600 cfm	1	43	1,290	90	43	0.32	4.01	2.63	0.37	0.38	1.13	589.94	0.02	0.22	0.14	0.02	0.02	0.06	32.44
Crawler-type drill, 4"	1	43	1,290	176	43	0.57	6.68	2.36	0.42	0.43	0.12	539.15	0.06	0.72	0.25	0.04	0.05	0.01	57.97
Dozer, 75 HP	1	23	690	75	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.01	0.16	0.06	0.01	0.01	0.00	18.14
Gas Engine Vibrator	1	1	30	2	55	57.01	1.42	291.97	7.03	7.64	0.22	1053.35	0.00	0.00	0.01	0.00	0.00	0.00	0.03
Gas Welding Machine	1	22	660	66	68	2.02	7.26	38.49	0.06	0.06	0.01	615.82	0.07	0.24	1.26	0.00	0.00	0.00	20.09
Grader, 30000 lb	1	2	60	204	59	0.32	4.26	1.45	0.27	0.28	0.12	537.25	0.00	0.03	0.01	0.00	0.00	0.00	4.28
Hydraulic excavator, 3.5 cy	1	11	330	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.01	0.05	0.02	0.00	0.00	0.00	5.57
Rolling Compactor	1	27	810	92	59	0.42	4.77	2.49	0.40	0.41	0.12	558.97	0.02	0.23	0.12	0.02	0.02	0.01	27.14
Fill Excavation																			
Dozer, 300 HP	1	26	240	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.05	0.72	0.29	0.05	0.04	0.02	82.00
Backhoe	1	6	30	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.01	0.03	0.03	0.00	0.00	0.00	2.58
Total Emissions													0.26	2.61	2.26	0.15	0.15	0.10	272.50

Table A-3. Construction Equipment Emissions under Backfill Alternative at Malmstrom AFB

Equipment Type/Activity	Number of Units	Weeks	Hours	Horsepower (hp)	Load Factor (%)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Demolition and Construction																			
Crane, hydraulic 33 ton	1	3	90	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.00	0.01	0.01	0.00	0.00	0.00	1.52
Crane, 40-tons	1	11	330	231	43	0.35	5.14	1.30	0.24	0.25	0.11	532.78	0.01	0.19	0.05	0.01	0.01	0.00	19.23
Compressor, 250 cfm	1	2	60	90	43	0.32	4.01	2.63	0.37	0.38	0.13	589.94	0.00	0.01	0.01	0.00	0.00	0.00	1.51
Compressor, 600 cfm	1	16	480	90	43	0.32	4.01	2.63	0.37	0.38	1.13	589.94	0.01	0.08	0.05	0.01	0.01	0.02	12.07
Crawler-type drill, 4"	1	16	480	176	43	0.57	6.68	2.36	0.42	0.43	0.12	539.15	0.02	0.27	0.09	0.02	0.02	0.00	21.57
Dozer, 75 HP	1	25	750	75	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.01	0.17	0.07	0.01	0.01	0.00	19.71
Gas Engine Vibrator	1	1	30	2	55	57.01	1.42	291.97	7.03	7.64	0.22	1053.35	0.00	0.00	0.01	0.00	0.00	0.00	0.03
Gas Welding Machine	1	22	660	66	68	2.02	7.26	38.49	0.06	0.06	0.01	615.82	0.07	0.24	1.26	0.00	0.00	0.00	20.09
Gradder, 30000 lb	1	2	60	204	59	0.32	4.26	1.45	0.27	0.28	0.12	537.25	0.00	0.03	0.01	0.00	0.00	0.00	4.28
Rolling Compactor	1	30	900	92	59	0.42	4.77	2.49	0.40	0.41	0.12	558.97	0.02	0.26	0.13	0.02	0.02	0.01	30.16
Fill Excavation																			
Dozer, 300 HP	1	30	900	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.06	0.83	0.34	0.05	0.05	0.02	94.62
Backhoe	1	8	240	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.01	0.04	0.03	0.01	0.01	0.00	3.44
Total Emissions													**0.21**	**2.12**	**2.06**	**0.13**	**0.13**	**0.05**	**228.23**

Table A-4. Construction Equipment Emissions under Explosive Implosion Alternative at F.E. Warren AFB

Equipment Type/Activity	Number of Units	Weeks	Hours	Horsepower (hp)	Load Factor (%)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Demolition and Construction																			
Backhoe loader	1	1	30	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Crane, hydraulic 33 ton	1	3	90	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.00	0.01	0.01	0.00	0.00	0.00	1.52
Crane, 40-tons	1	11	330	231	43	0.35	5.14	1.30	0.24	0.25	0.11	532.78	0.01	0.19	0.05	0.01	0.01	0.00	19.23
Compressor, 250 cfm	1	2	60	90	43	0.32	4.01	2.63	0.37	0.38	0.13	589.94	0.00	0.01	0.01	0.00	0.00	0.00	1.51
Compressor, 600 cfm	1	43	1,290	90	43	0.32	4.01	2.63	0.37	0.38	1.13	589.94	0.02	0.22	0.14	0.02	0.02	0.06	32.44
Crawler-type drill, 4"	1	43	1,290	176	43	0.57	6.68	2.36	0.42	0.43	0.12	539.15	0.06	0.72	0.25	0.04	0.05	0.01	57.97
Dozer, 75 HP	1	25	750	75	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.01	0.17	0.07	0.01	0.01	0.00	19.71
Gas Engine Vibrator	1	1	30	2	55	57.01	1.42	291.97	7.03	7.64	0.22	1053.35	0.00	0.00	0.01	0.00	0.00	0.00	0.03
Gas Welding Machine	1	22	660	66	68	2.02	7.26	38.49	0.06	0.06	0.01	615.82	0.07	0.24	1.26	0.00	0.00	0.00	20.09
Gradder, 30000 lb	1	3	90	204	59	0.32	4.26	1.45	0.27	0.28	0.12	537.25	0.00	0.05	0.02	0.00	0.00	0.00	6.42
Hydraulic excavator, 3.5 cy	1	11	330	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.01	0.05	0.02	0.00	0.00	0.00	5.57
Rolling Compactor	1	27	810	92	59	0.42	4.77	2.49	0.40	0.41	0.12	558.97	0.02	0.23	0.12	0.02	0.02	0.01	27.14
Fill Excavation																			
Dozer, 300 HP	1	26	780	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.05	0.72	0.29	0.05	0.04	0.02	82.00
Backhoe	1	6	180	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.01	0.03	0.03	0.00	0.00	0.00	2.58
Total Emissions													**0.26**	**2.63**	**2.28**	**0.16**	**0.15**	**0.10**	**276.64**

Table A-5. Construction Equipment Emissions under Backfill Alternative at F.E. Warren AFB

Equipment Type/Activity	Number of Units	Weeks	Hours	Horsepower (hp)	Load Factor (%)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Demolition and Construction																			
Backhoe loader	1	1	30	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Crane, hydraulic 33 ton	1	3	90	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.00	0.01	0.01	0.00	0.00	0.00	1.52
Crane, 40-tons	1	11	330	231	43	0.35	5.14	1.30	0.24	0.25	0.11	532.78	0.01	0.19	0.05	0.01	0.01	0.00	19.23
Compressor, 250 cfm	1	2	60	90	43	0.32	4.01	2.63	0.37	0.38	0.13	589.94	0.00	0.01	0.01	0.00	0.00	0.00	1.51
Compressor, 600 cfm	1	16	480	90	43	0.32	4.01	2.63	0.37	0.38	1.13	589.94	0.01	0.08	0.05	0.01	0.01	0.02	12.07
Crawler-type drill, 4"	1	16	480	176	43	0.57	6.68	2.36	0.42	0.43	0.12	539.15	0.02	0.27	0.09	0.02	0.02	0.00	21.57
Dozer, 75 HP	1	28	840	75	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.01	0.19	0.08	0.01	0.01	0.00	22.08
Gas Engine Vibrator	1	1	30	2	55	57.01	1.42	291.97	7.03	7.64	0.22	1053.35	0.00	0.00	0.01	0.00	0.00	0.00	0.03
Gas Welding Machine	1	22	660	66	68	2.02	7.26	38.49	0.06	0.06	0.01	615.82	0.07	0.24	1.26	0.00	0.00	0.00	20.09
Gradder, 30000 lb	1	3	90	204	59	0.32	4.26	1.45	0.27	0.28	0.12	537.25	0.00	0.05	0.02	0.00	0.00	0.00	6.42
Rolling Compactor	1	30	900	92	59	0.42	4.77	2.49	0.40	0.41	0.12	558.97	0.02	0.26	0.13	0.02	0.02	0.01	30.16
Fill Excavation																			
Dozer, 300 HP	1	30	900	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.06	0.83	0.34	0.05	0.05	0.02	94.62
Backhoe	1	8	240	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.01	0.04	0.03	0.01	0.01	0.00	3.44
Total Emissions													**0.21**	**2.16**	**2.08**	**0.13**	**0.13**	**0.05**	**233.17**

Table A-6. Construction Equipment Emissions under Explosive Implosion Alternative at Vandenberg AFB

Equipment Type/Activity	Number of Units	Weeks	Hours	Horsepower (hp)	Load Factor (%)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Demolition and Construction																			
Asphalt paver, 130HP	1	1	30	130	59	0.38	4.59	2.07	0.35	0.36	0.12	550.19	0.00	0.01	0.01	0.00	0.00	0.00	1.39
Crane, hydraulic 33 ton	1	2	60	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.00	0.01	0.00	0.00	0.00	0.00	1.01
Crane, 40-tons	1	1	30	231	43	0.35	5.14	1.30	0.24	0.25	0.11	532.78	0.00	0.02	0.00	0.00	0.00	0.00	1.75
Compressor, 250 cfm	1	1	30	90	43	0.32	4.01	2.63	0.37	0.38	0.13	589.94	0.00	0.01	0.00	0.00	0.00	0.00	0.75
Compressor, 600 cfm	1	4	120	90	43	0.32	4.01	2.63	0.37	0.38	1.13	589.94	0.00	0.02	0.01	0.00	0.00	0.01	3.02
Crawler-type drill, 4"	1	4	120	176	43	0.57	6.68	2.36	0.42	0.43	0.12	539.15	0.01	0.07	0.02	0.00	0.00	0.00	5.39
Dozer, 75 HP	1	2	60	75	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.01	0.01	0.00	0.00	0.00	1.58
Dozer, 300 HP	1	1	30	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.03	0.01	0.00	0.00	0.00	3.15
Front end loader	1	3	90	243	59	0.37	5.05	2.09	0.32	0.33	0.12	539.44	0.01	0.07	0.03	0.00	0.00	0.00	7.65
Gradder, 30000 lb	1	1	30	204	59	0.32	4.26	1.45	0.27	0.28	0.12	537.25	0.00	0.02	0.01	0.00	0.00	0.00	2.14
Hydraulic excavator, 3.5 cy	1	1	30	62	43	0.56	5.41	2.43	0.44	0.45	0.12	576.01	0.00	0.00	0.00	0.00	0.00	0.00	0.51
Rolling Compactor	1	5	150	92	59	0.42	4.77	2.49	0.40	0.41	0.12	558.97	0.00	0.04	0.02	0.00	0.00	0.00	5.03
Fill Excavation																			
Dozer, 300 HP	1	2	60	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.06	0.02	0.00	0.00	0.00	6.31
Backhoe	1	1	30	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Total Emissions													**0.02**	**0.37**	**0.14**	**0.00**	**0.00**	**0.01**	**40.12**

Table A-7. Construction Equipment Emissions under Backfill Alternative at Vandenberg AFB

Equipment Type/Activity	Number of Units	Weeks	Hours	Horsepower (hp)	Load Factor (%)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Demolition and Construction																			
Asphalt paver, 130HP	1	1	30	130	59	0.38	4.59	2.07	0.35	0.36	0.12	550.19	0.00	0.01	0.01	0.00	0.00	0.00	1.39
Crane, 40-tons	1	1	30	231	43	0.35	5.14	1.30	0.24	0.25	0.11	532.78	0.00	0.02	0.00	0.00	0.00	0.00	1.75
Compressor, 250 cfm	1	1	30	90	43	0.32	4.01	2.63	0.37	0.38	0.13	589.94	0.00	0.01	0.00	0.00	0.00	0.00	0.75
Compressor, 600 cfm	1	1	30	90	43	0.32	4.01	2.63	0.37	0.38	1.13	589.94	0.00	0.01	0.00	0.00	0.00	0.00	0.75
Crawler-type drill, 4"	1	1	30	176	43	0.57	6.68	2.36	0.42	0.43	0.12	539.15	0.00	0.02	0.01	0.00	0.00	0.00	1.35
Dozer, 75 HP	1	2	60	75	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.01	0.01	0.00	0.00	0.00	1.58
Dozer, 300 HP	1	1	30	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.03	0.01	0.00	0.00	0.00	3.15
Front end loader	1	1	30	243	59	0.37	5.05	2.09	0.32	0.33	0.12	539.44	0.00	0.02	0.01	0.00	0.00	0.00	2.55
Gradder, 30000 lb	1	1	30	204	59	0.32	4.26	1.45	0.27	0.28	0.12	537.25	0.00	0.02	0.01	0.00	0.00	0.00	2.14
Rolling Compactor	1	6	180	92	59	0.42	4.77	2.49	0.40	0.41	0.12	558.97	0.00	0.05	0.03	0.00	0.00	0.00	6.03
Fill Excavation																			
Dozer, 300 HP	1	3	90	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.09	0.03	0.00	0.00	0.00	9.45
Backhoe	1	1	30	93	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Total Emissions													**0.00**	**0.29**	**0.12**	**0.00**	**0.00**	**0.00**	**31.32**

Table A-8. Motor Vehicle Emissions Worksheet for Explosive Implosion Alternative at Malmstrom AFB

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Truck Emissions																
Construction																
Total Vehicles =	973															
Total working days =	250															
Running mins per day per veh =	120	1,946	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.02	0.23	0.08	0.01	0.01	0.00	75.90
Off-base Fill Transportation																
Total Vehicles =	2045															
Unit Trip Miles =	30															
Average Speed =	25	2,454	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.03	0.29	0.10	0.01	0.01	0.00	95.72
Total Emissions										0.05	0.52	0.18	0.02	0.02	0.00	171.62

Table A-8. Motor Vehicle Emissions Worksheet for Explosive Implosion Alternative at Malmstrom AFB (Continued)

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Commuter Vehicle Emissions																
Construction																
Total vehicles =	2,438															
Total working days =	250															
Running mins per day per veh =	20	813	0.04	0.03	0.41	0.00	0.00	0.00	24.33	0.02	0.01	0.17	0.00	0.00	0.00	9.89

Table A-9. Motor Vehicle Emissions Worksheet for Backfill Alternative at Malmstrom AFB

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Truck Emissions																
Construction																
Total Vehicles =	734															
Total working days =	250															
Running mins per day per veh =	120	1,468	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.02	0.18	0.06	0.01	0.01	0.00	57.26
Off-base Fill Transportation																
Total Vehicles =	2295															
Unit Trip Miles =	30															
Average Speed =	25	2,754	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.03	0.33	0.12	0.01	0.01	0.00	107.42
Total Emissions										0.05	0.51	0.18	0.02	0.02	0.00	164.68

Table A-9. Motor Vehicle Emissions Worksheet for Backfill Alternative at Malmstrom AFB (continued)

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Commuter Vehicle Emissions																
Construction																
Total vehicles =	1,566															
Total working days =	250															
Running mins per day per veh =	20	522	0.04	0.03	0.41	0.00	0.00	0.00	24.33	0.01	0.01	0.11	0.00	0.00	0.00	6.35

Table A-10. Motor Vehicle Emissions Worksheet for Explosive Implosion Alternative at F.E. Warren AFB

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Truck Emissions																
Construction																
Total Vehicles =	1,000															
Total working days =	250															
Running mins per day per veh =	120	2,000	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.02	0.24	0.08	0.01	0.01	0.00	78.01
Off-base Fill Transportation																
Total Vehicles =	2045															
Unit Trip Miles =	30															
Average Speed =	25	2,454	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.03	0.29	0.10	0.01	0.01	0.00	95.72
Total Emissions										0.05	0.53	0.18	0.02	0.02	0.00	173.73

Table A-10. Motor Vehicle Emissions Worksheet for Explosive Implosion Alternative at F.E. Warren AFB (continued)

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Commuter Vehicle Emissions																
Construction																
Total vehicles =	2,475															
Total working days =	250															
Running mins per day per veh =	20	825	0.04	0.03	0.41	0.00	0.00	0.00	24.33	0.02	0.01	0.17	0.00	0.00	0.00	10.04

Table A-11. Motor Vehicle Emissions Worksheet for Backfill Alternative at F.E. Warren AFB

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Truck Emissions																
Construction																
Total Vehicles =	762															
Total working days =	250															
Running mins per day per veh =	120	1,524	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.02	0.18	0.06	0.01	0.01	0.00	59.44
Off-base Fill Transportation																
Total Vehicles =	2295															
Unit Trip Miles =	30															
Average Speed =	25	2,754	0.02	0.24	0.08	0.01	0.01	0.00	78.01	0.03	0.33	0.12	0.01	0.01	0.00	107.42
Total Emissions										0.05	0.51	0.18	0.02	0.02	0.00	166.86

Table A-11. Motor Vehicle Emissions Worksheet for Backfill Alternative at F.E. Warren AFB (continued)

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Commuter Vehicle Emissions																
Construction																
Total vehicles =	1,603															
Total working days =	250															
Running mins per day per veh =	20	534	0.04	0.03	0.41	0.00	0.00	0.00	24.33	0.01	0.01	0.11	0.00	0.00	0.00	6.50

Table A-12. Motor Vehicle Emissions Worksheet for Explosive Implosion Alternative at Vandenberg AFB

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Truck Emissions																
Construction																
Total Vehicles =	96															
Total working days =	250															
Running mins per day per veh =	120	192	0.09	0.62	0.61	0.02	0.03	0.00	104.69	0.01	0.06	0.06	0.00	0.00	0.00	10.05
Off-base Fill Transportation																
Total Vehicles =	160															
Unit Trip Miles =	30															
Average Speed =	25	192	0.09	0.62	0.61	0.02	0.03	0.00	104.69	0.01	0.06	0.06	0.00	0.00	0.00	10.05
Total Emissions										0.02	0.12	0.12	0.00	0.00	0.00	20.10

Table A-12. Motor Vehicle Emissions Worksheet for Explosive Implosion Alternative at Vandenberg AFB (continued)

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Commuter Vehicle Emissions																
Construction																
Total vehicles =	263															
Total working days =	250															
Running mins per day per veh =	20	88	0.01	0.02	0.26	0.00	0.00	0.00	23.87	0.00	0.00	0.01	0.00	0.00	0.00	1.05

Table A-13. Motor Vehicle Emissions Worksheet for Backfill Alternative at Vandenberg AFB

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Truck Emissions																
Construction																
Total Vehicles =	61															
Total working days =	250															
Running mins per day per veh =	120	122	0.09	0.62	0.61	0.02	0.03	0.00	104.69	0.01	0.04	0.04	0.00	0.00	0.00	6.39
Off-base Fill Transportation																
Total Vehicles =	180															
Unit Trip Miles =	30															
Average Speed =	25	216	0.09	0.62	0.61	0.02	0.03	0.00	104.69	0.01	0.07	0.07	0.00	0.00	0.00	11.31
Total Emissions										0.02	0.14	0.14	0.00	0.00	0.00	17.70

Table A-13. Motor Vehicle Emissions Worksheet for Backfill Alternative at Vandenberg AFB (continued)

Activity		Hours of Operation	VOC Emission factor	NOx Emission factor	CO Emission factor	$PM_{2.5}$ Emission factor	PM_{10} Emission factor	SO_2 Emission factor	CO_2e Emission factor	Emissions (tons)						
			(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Commuter Vehicle Emissions																
Construction																
Total vehicles =	131															
Total working days =	250															
Running mins per day per veh =	20	44	0.01	0.02	0.26	0.00	0.00	0.00	23.87	0.00	0.00	0.01	0.00	0.00	0.00	0.52

Table A-14. Total Emissions Levels under Explosive Implosion Alternative at Malmstrom AFB

Emission Source	Pollutant (tons)						
	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Construction Equipment	0.26	2.60	2.26	0.16	0.15	0.10	272.50
Motor Vehicles	0.07	0.53	0.35	0.02	0.02	0.00	181.51
Total Emission	0.33	3.13	2.61	0.18	0.17	0.10	454.01

Table A-15. Total Emissions Levels under Backfill Alternative at Malmstrom AFB

Emission Source	Pollutant (tons)						
	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Construction Equipment	0.21	2.12	2.06	0.13	0.13	0.05	228.23
Motor Vehicles	0.06	0.52	0.29	0.02	0.02	0.00	171.03
Total Emission	0.27	2.64	2.35	0.15	0.15	0.05	399.26

Table A-16. Total Emissions Levels under Explosive Implosion Alternative at F.E. Warren AFB

Emission Source	Pollutant (tons)						
	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Construction Equipment	0.26	2.63	2.28	0.16	0.15	0.10	276.64
Motor Vehicles	0.07	0.54	0.35	0.02	0.02	0.00	183.77
Total Emission	0.33	3.17	2.63	0.18	0.17	0.10	460.41

Table A-17. Total Emissions Levels under Backfill Alternative at F.E. Warren AFB

Emission Source	Pollutant (tons)						
	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Construction Equipment	0.21	2.16	2.08	0.13	0.13	0.05	233.17
Motor Vehicles	0.06	0.52	0.29	0.02	0.02	0.00	173.36
Total Emission	0.27	2.68	2.37	0.15	0.15	0.05	406.53

Table A-18. Total Emissions Levels under Explosive Implosion Alternative at Vandenberg AFB

Emission Source	Pollutant (tons)						
	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Construction Equipment	0.02	0.37	0.14	0.00	0.00	0.01	40.12
Motor Vehicles	0.02	0.12	0.13	0.00	0.00	0.00	21.15
Total Emission	0.04	0.49	0.27	0.00	0.00	0.01	61.27

Table A-19. Total Emissions Levels under Backfill Alternative at Vandenberg AFB

Emission Source	Pollutant (tons)						
	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2e
Construction Equipment	0.00	0.29	0.12	0.00	0.00	0.00	31.32
Motor Vehicles	0.02	0.14	0.15	0.00	0.00	0.00	18.22
Total Emission	0.02	0.43	0.27	0.00	0.00	0.00	49.54

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