Missile Defense Agency
Flexible Target Family

Environmental Assessment

October 2007

Department of Defense
Missile Defense Agency
7100 Defense Pentagon
Washington, DC 20301-7100

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FLEXIBLE TARGET FAMILY
ENVIRONMENTAL ASSESSMENT

AGENCY: Missile Defense Agency

ACTION: Draft Finding of No Significant Impact

BACKGROUND: Pursuant to the National Environmental Policy Act (NEPA); the Council on Environmental Quality regulations that implement NEPA (Code of Federal Regulations [CFR], Title 40, Parts 1500-1508); Department of Defense Instruction 4715.9, Environmental Planning and Analysis; and the applicable service regulations that implement these laws and regulations, the Missile Defense Agency (MDA) has made a Finding of No Significant Impact (FONSI) with respect to the proposed Flexible Target Family (FTF). The FTF would streamline MDA's target acquisition process by using a collection of common boosters, front sections, and components to assemble a variety of different target configurations. Specialized equipment used to transport, test, and handle assembled targets is also part of the FTF and is considered in the analysis documented in the FTF Environmental Analysis (EA). MDA has determined that the EA prepared for the FTF represents an accurate and adequate analysis of the scope and level of associated environmental impacts.

DESCRIPTION OF THE PROPOSED ACTION:

MDA proposes to streamline its target development and acquisition process by using common processes and procedures, and common core components to assemble a standardized inventory of target boosters, front sections, and components. This would increase target reliability, minimize cost, and reduce target production time.

The EA considers the development, preparation, assembly, integration, testing, transportation, and use of the FTF to support BMDS testing. Development would consist of the conceptual and physical development of new boosters and targets or technologies. Preparation would consist of pre-assembly work and, in some cases, minor modifications to motors. Assembly, integration and testing would include attaching the target missile front section, interstages, and boosters; loading of simulants or explosives; spinning of the target front section to confirm proper weight distribution; and testing electronics and components. If necessary, targets could be stored at the integration facility (the liquid targets would be stored unfueled). The assembled targets would be transported by truck, aircraft, and barge to the launch/staging locations for land, sea, and air launches.

Land launch locations requiring site preparation and construction to accommodate the FTF include Kodiak Launch Complex (KLC), Kodiak, Alaska; Vandenberg Air Force Base (VAFB), California; United States Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS), Meck Island, Republic of the Marshall

Islands; and Wake Island. Land launch locations not requiring any prior site preparation or construction include Pacific Missile Range Facility (PMRF), Hawaii; White Sands Missile Range (WSMR), New Mexico; and Fort Wingate Army Depot (FWAD), New Mexico.

Sea launches would occur from the broad ocean area (BOA) and would be conducted from a free floating sea-based platform, such as MDA's Mobile Launch Platform (MLP), that would not be anchored to the ocean floor during sea launches. Sea launches would be staged from Pearl Harbor, Hawaii. Staging could include final integration and testing and securing the target onboard the sea-based platform.

Air launch of solid propellant targets in the FTF would be from contractor or government supplied C-17 cargo aircraft. No air launches of liquid propellant FTF targets would occur. Air launches would be staged from Yuma Proving Ground (YPG), Arizona; Elmendorf AFB, Alaska; Misawa Air Base (AB), Japan; and PMRF, Hawaii. Following arrival of the target shipment at the appropriate staging location, the solid propellant target would be secured to the pallet and final functional tests would be performed. Additionally, a small amount of hydrazine would be loaded into the attitude control module attitude control system for the SR19, Castor IVB, SR19/SR19, and LV-2 targets. Following pre-launch staging activities, the C-17 would fly to a predetermined drop point over the BOA.

ALTERNATIVES TO THE PROPOSED ACTION:

Alternative 1 would be the same as the proposed action except that the proposed new target configurations, the LV-2 and SR19/SR73, would only be launched from land locations and land and sea locations, respectively; air-based launches of the LV-2 and SR19/SR73 would not occur under Alternative 1. This would allow MDA to continue to produce targets to support tests but would restrict the development of some testing scenarios.

Under the no action alternative, MDA would continue to launch those targets already addressed from locations already analyzed in previous NEPA analyses; no new FTF target missile configurations would be launched to support testing. The No Action Alternative does not meet the purpose and need for the proposed action because it would severely limit MDA's ability to provide increasingly realistic test scenarios as needed to adequately test the BMDS.

ENVIRONMENTAL EFFECTS:

Environmental Impacts

Potential impacts to the human environment associated with implementing the FTF arise primarily from site preparation and construction activities at KLC; VAFB; USAKA/RTS; and Wake Island, and the transportation of solid- and liquid-propellant target missiles from the Courtland Target Assembly Facility, Courtland, AL, and the Lockheed Martin Target Missile Systems facility, Madison County, AL, respectively, to the proposed staging and launch sites.

Site preparation and construction activities could increase levels of particulate matter and engine exhaust emissions. Best management practices would be used to reduce fugitive dust and timely equipment tune up and maintenance would help to keep exhaust emissions below federal *de minimus* standards. All ground-disturbing activities would occur in accordance with applicable cultural resources management plans. Erosion and siltation of water bodies near construction sites would be minimized by implementing best management practices. General safety procedures would be followed to protect construction workers and launch site employees. Noise from construction activities would comply with OSHA, applicable DoD Health and Safety regulations and guidelines, Range Safety requirements, and any other standard operating procedures that involve construction and facility modifications.

Transportation of missiles from target assembly and integration facilities to Redstone Arsenal could increase levels of engine exhaust emissions. Solid-propellant and liquid-propellant target missiles would be transported by truck from the Courtland Target Assembly Facility and the Lockheed Martin Target Missile Systems Facility, respectively, to Redstone Arsenal in Huntsville, Alabama. Up to a maximum of 12 trucks would be required to move the targets 69 kilometers (43 miles) over public roads to Redstone Arsenal. Once at the Redstone Army Airfield, each shipment would require up to seven C-17 and one C-5 aircraft for air transport to the launch site.

If the maximum of 20 FTF target shipments occurred from the Redstone Arsenal Army Airfield, those shipments would add up to 140 additional C-17 takeoffs, 140 additional C-17 landings, 20 additional C-5 takeoffs, and 20 additional C-5 landings to the airfield per year (a total of 320 additional takeoffs and landings per year). The addition of a maximum 320 movements per year to the airfield's current operations tempo would result in an increase of only 1.4% over current operating conditions. This would not be considered a significant increase in operations.

Although both Lawrence and Madison Counties in Alabama are in attainment for all Federal National Ambient Air Quality Standards (NAAQS), the total annual emissions resulting from transportation of target missiles by truck to Redstone Arsenal and air transport from Redstone Arsenal to the target launch facilities were compared to the *de minimis* annual emission levels for NAAQS non-attainment areas to determine whether the emissions would have a negative impact on air quality. All estimated emissions that would result from truck and air transportation activities in Lawrence and Madison Counties are less than the *de minimis* levels. Therefore, the emissions of all criteria air pollutants and precursor pollutants associated with the transportation of FTF targets from assembly and integration facilities to Redstone Arsenal and then to target launch facilities would not result in a significant impact on air quality in the region.

Expected impacts to the human environment resulting from site preparation and construction activities at KLC; VAFB; USAKA/RTS; and Wake Island; and the transportation of solid- and liquid-propellant target missiles from target assembly facilities to the proposed staging and launch sites would be negligible.

Cumulative Impacts

MDA considered the cumulative impacts of the transportation of FTF targets by ground from the target integration facility in Alabama to Redstone Arsenal, transportation by air from the Redstone Arsenal Army Airfield to the launch and staging locations, and the pre-launch, launch, and post-launch FTF activities that would occur at specific land launch locations that already support MDA target launches and staging locations on existing installations worldwide. The MDA has determined that no cumulative impacts would be associated with implementing the FTF.

CONCLUSION: An analysis of the proposed action has concluded that there are no significant short-term or long-term effects to the environment or surrounding populations. After thoroughly considering the facts herein, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives set forth in Section 101(a) of NEPA and that it will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to Section 102 (2) (c) of NEPA. Therefore, an EIS for the proposed action is not required.

DEADLINE FOR RECEIPT OF WRITTEN COMMENTS: 13 November 2007

POINT OF CONTACT: Submit written comments or requests for a copy of the Flexible Targets Family EA to: FTF EA, c/o ICF International, 9300 Lee Highway, Fairfax VA 22031; or via E-mail ftf.ea@icfi.com.

FLEXIBLE TARGET FAMILY
ENVIRONMENTAL ASSESSMENT

AGENCY: Missile Defense Agency

ACTION: Finding of No Significant Impact

PROPONENT:

______________________________DATE: ________________________

MARY ANN STASIAK
Deputy for Targets and Countermeasures

APPROVED:

______________________________DATE:________________________

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Deputy for Agency Operations

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EXECUTIVE SUMMARY

Introduction

The Missile Defense Agency (MDA) prepared an Environmental Assessment (EA) to assess the environmental impacts of providing a Flexible Target Family (FTF) to support the testing of the Ballistic Missile Defense System (BMDS). Target missiles are used to test the BMDS by imitating threat missiles. They are typically composed of one or more rocket motors (also known as boosters or stages) and a front section. The FTF would consist of a collection of common boosters, front sections, and components that could be used to assemble a variety of different target configurations. The FTF also would include transportation, testing and handling equipment for the assembled targets. The purpose of the proposed action is to provide a flexible family of targets that MDA can use to test the BMDS under increasingly realistic scenarios. The use of common components would streamline the target production process.

Purpose and Need for Proposed Action

The FTF would streamline MDA's target development and acquisition process and would provide additional flexibility by using common processes and procedures to assemble a standardized inventory of target boosters, front sections, and components. The FTF would fulfill MDA's need to have access to targets that mimic realistic threat missiles and can be used to test the BMDS. The use of common core components for reentry vehicles, instrumentation, countermeasures, boosters, and ground support equipment would increase target system reliability, minimize cost, and reduce cycle time. This would facilitate MDA's mission by reducing the time required to produce targets needed to test BMDS capabilities.

Proposed Action

The FTF would consist of common target components and ground support equipment. Targets are typically composed of one or more rocket motors (also known as boosters or stages) and a front section. Adapters or interstages separate the individual motors and also the motors from the front section of the target. Within the FTF, a collection of common boosters and interstage front section components would be used to assemble targets with different flight capabilities. The FTF front section components would include reentry vehicles, avionics control modules, and payload deployment modules. Common payload deployment modules could contain sensors, countermeasures, and simulants. These sensors, countermeasures, and simulants would be specific to the test being supported and would be analyzed as appropriate in subsequent environmental analysis for specific tests.

The FTF is envisioned to include at least eight different targets. Each target would be comprised of one, two, or three stages that could use liquid or solid propellant motors. The total propellant quantities for these eight vehicles range from approximately 3,775 kilograms (8,306 pounds) to 43,258 kilograms (95,367 pounds). The FTF targets may be land-, sea-, or air-launched, depending on the specific target configuration and mission requirements.

Exhibit ES-1 identifies representative target configurations that comprise the FTF as well as the platforms from which these targets would be launched. In addition to the propellants listed in Exhibit ES-1, SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 targets may use a liquid-fueled hot gas attitude control section (ACS).

Exhibit ES-1. Representative FTF Target Configurations and Launch Platforms

	LPT[1]	SR19	Castor IVB	SR19 M57	SR19 SR19	SR19 SR73	C-4 First Stage C-4 Second Stage	C-4 First Stage C-4 First Stage C-4 Second Stage
Common Name							LV-2	LV-3
Launch Platform[2]	L, S	L, A, S	L, A, S	L, A, S	L, A, S	L, A, S	L, A	L
Target Range	Short	Short	Intermediate	Intermediate	Intermediate	Intermediate	Long	Long
Existing Target Rocket	Yes	Yes	Yes	Yes	Yes	No	No	No
Propellant Type	Liquid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
First Stage Propellant Class[3]	N/A	Class 1.3	Class 1.3	Class 1.3	Class 1.3	Class 1.3	Class 1.1	Class 1.1
First Stage Propellant Quantity, kg (lb)[4]	3,775 (8,306)	6,238 (13,752)	9,975 (21,991)	6,238 (13,752)	6,238 (13,752)	6,238 (13,752)	17,667 (38,949)	17,667 (38,949)
Second Stage Propellant Class	N/A	N/A	N/A	Class 1.3	Class 1.3	Class 1.3	Class 1.1	Class 1.1
Second Stage Propellant Quantity, kg (lb)	N/A	N/A	N/A	1,659 (3,657)	6,238 (13,752)	3,111 (6,859)	7,924 (17,469)	17,667 (38,949)
Third Stage Propellant Class	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Class 1.1
Third Stage Propellant Quantity, kg (lb)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7,924 (17,469)
Total Propellant Quantity, kg (lb)	3,775 (8,306)	6,238 (13,752)	9,975 (21,991)	7,897 (17,410)	12,476 (27,505)	9,349 (20,611)	25,591 (56,418)	43,258 (95,367)

[1] Liquid Propellant Target (LPT) is the only liquid propelled target in the FTF and is not assembled and integrated at the Courtland Target Facility.

[2] Launch platforms: L=land; S=sea; A=air

[3] Explosives are divided into classes to describe their hazard potential. For example, substances that have a mass explosion hazard are classified as Class 1.1; substances that pose a projection hazard, but not a mass explosion hazard are classified as Class 1.2; and substances that pose a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard are classified as Class 1.3. http://www.electromark.com/help/DOT/explosive_11_12_13.asp. Accessed March 13, 2006

[4] kg = kilograms; lb = pounds

The EA considers the development, preparation, assembly, integration, testing, transportation, and use of FTF targets to support BMDS testing. Development would consist of the conceptual and physical development of new boosters and FTF targets or technologies. Preparation would consist of pre-assembly work and in some cases minor modifications to motors. Assembly, integration and testing of targets using solid rocket motors would be completed at the Lockheed Martin Space Systems Company Courtland, Alabama Target Integration Facility; liquid propellant motors would be handled at the Lockheed Martin Target Missile Systems facility. If necessary, the targets could be stored at the integration facility (the liquid targets would be stored unfueled) for up to one year. The assembled targets would be transported by truck, aircraft and barge to the launch/staging locations.

The use of the FTF targets can be organized into pre-launch, launch, and post-launch activities. *Pre-launch* activities for **land** launches would include site preparation and construction, short term storage of the target, pad setup, final integration and testing of the target, clearing the range area, loading the target with propellant (for liquid fuel targets and other minor requirements), and other range requirements prior to launch, as appropriate. *Pre-launch* activities for **sea** and **air** launches would occur at staging locations and include all of the above activities except site preparation and construction. *Launch* activities include the launch and flight of the target, beginning with first stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept (some missions), and debris generation. *Post-launch* activities would consist of debris clean up including minor refurbishment of the launch stand, pad, or rails, potential recovery, and return of the support equipment to the appropriate storage facility.

The FTF targets would be flown in military C-17 or C-5 transport aircraft from Redstone Arsenal to appropriate land launch sites or staging locations for sea or air launch. Launches would take place from appropriate land, sea and air launch locations as discussed below.

- Land launch locations requiring site preparation and construction to accommodate FTF targets include Kodiak Launch Complex (KLC), Kodiak, Alaska; Vandenberg Air Force Base (AFB), California; United States Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS), Meck Island, Republic of the Marshall Islands; and Wake Island. Land launch locations not requiring any prior site preparation or construction include Pacific Missile Range Facility (PMRF), Hawaii; White Sands Missile Range (WSMR), New Mexico; and Fort Wingate Army Depot (FWAD), New Mexico.
- Sea launches would occur from the broad ocean area (BOA) and would be conducted from a free floating platform, such as the Mobile Launch Platform (MLP), that would not be anchored to the ocean floor during sea launches. Sea launches would be staged from Pearl Harbor, Hawaii. Staging could include final integration and testing and

securing the target onboard the MLP. A liquid propellant target would be fueled onboard the MLP in route to the launch location.

- Air launch of solid propellant FTF targets would be from the C-17 cargo aircraft. No air launches of liquid propellant FTF targets would occur. Air launches of FTF targets could be conducted from contractor or government supplied C-17 aircraft. Air launches would be staged from Yuma Proving Ground (YPG), Arizona; Elmendorf AFB, Alaska; Misawa Air Base (AB), Japan; and PMRF, Hawaii. Air launch staging activities at all locations would be similar. Following arrival of the target shipment at the appropriate staging location, the solid propellant target would be secured to the pallet and final functional tests would be performed. Additionally, a small amount of hydrazine would be loaded into the avionics control module attitude control system for the SR19, Castor IVB, SR19/SR19 and LV-2 targets. Following pre-launch staging activities, the C-17 would fly to a predetermined drop point over the BOA.

Alternatives

Alternative 1 also would consist of the development; preparation; assembly, integration, and testing; transportation; and use of FTF targets to support BMDS testing. However, the proposed new target configurations, the LV-2 and SR19/SR73, would only be launched from land locations and land and sea locations, respectively; air-based launches of the LV-2 and SR19/SR73 would not occur under Alternative 1. This would allow MDA to continue to produce targets to test the BMDS but would restrict the development of some testing scenarios.

The no action alternative would consist of launching only those targets that have had previous NEPA analyses of their launches from land-, air-, and sea-based launch locations; no new FTF target configurations would be launched to support BMDS testing. The three proposed new target configurations, the SR19/SR73, LV-2, and LV-3 that have not previously been considered under NEPA would not be launched from any of the locations considered in the EA. These configurations would still be assembled and integrated at the Courtland Target Assembly Facility in Courtland, Alabama. Under the no action alternative, MDA would continue to launch those targets that had already been addressed from locations already analyzed in previous NEPA analyses. This does not meet the purpose and need for the proposed action because it would severely limit MDA's ability to provide increasingly realistic scenarios needed to adequately test the BMDS.

Environmental Effects

Analysis Process

Thirteen resource areas were considered to provide a context for understanding and assessing the potential environmental effects of the proposed action. The resource areas considered included air quality, airspace, biological resources, cultural resources, geology and soils, hazardous materials and hazardous waste, health and safety, land use, noise, socioeconomics and environmental justice, transportation, visual resources, and water resources. For each resource area, the Region of Influence (ROI) was determined. The ROI describes a region for each resource area that comprises the areal extent that could be affected by the proposed action. The environmental consequences associated with the proposed action, alternative 1, and the no action alternative, were analyzed for each resource area.

The environmental analysis of the FTF considered the activities discussed above for the proposed action and alternatives. All activities associated with the FTF Program were addressed in one of three ways. They were either 1) dismissed because they were not expected to create any impacts to any resource areas; 2) not analyzed in this EA because they had been previously analyzed in NEPA documentation either tiered from or incorporated by reference; or 3) analyzed in this EA.

Activities Dismissed from Analysis

The ***development*** and ***preparation*** activities related to FTF targets were dismissed from analysis because these activities would occur at facilities that currently routinely perform these types of activities and the development would not introduce any activities different from those already conducted at these facilities. The ***storage*** of liquid propellant FTF targets prior to shipment to launch/staging locations would not have any environmental consequences because these vehicles would not be loaded with propellant until they arrive at the launch location and prior to launch.

Activities Previously Analyzed

The ***assembly, integration*** and ***testing*** of solid propellant targets was analyzed in the Courtland Target Assembly Facility EA. (MDA, 2006) The Courtland EA concluded that there would be no significant impacts on any resource area from operational activities at the Courtland facility.

The final ***assembly*** and ***integration*** of the front section of the liquid propellant target has been analyzed in the WSMR Liquid Propellant Target (LPT) EA, which concluded that propellant storage and transportation of the missiles and associated equipment would not impact air quality. (MDA, 2002a) The WSMR LPT EA further concluded that assembly and integration of liquid propellant targets would have no impact on any resource areas. The final assembly and integration of the front section of liquid propellant targets at the Lockheed Martin Target Missile Systems facility would be expected to have similar and no greater effects than those described for WSMR.

The ***storage*** of solid propellant targets at Courtland has been analyzed in the Courtland Target Assembly Facility EA, which concluded that there would be no significant impacts on health and safety. (MDA, 2006) As stated above liquid propellant targets would be stored unfueled prior to shipment for launch and would be launched within eight to ten days of propellant loading at the launch site.

General pre-launch, launch, and post-launch impacts of solid and liquid propellant missiles have been analyzed in the BMDS PEIS (MDA, 2007a). The BMDS PEIS analyzes launch activities from land, sea and air launch environments for worldwide biomes that include the locations proposed for FTF activities. The analysis in this EA is tiered from the BMDS PEIS. Further, many of the pre-launch, launch, and post-launch activities that are part of the proposed action have been previously analyzed in existing NEPA documentation as discussed below.

Land Launches

Pre-launch. Pre-launch activities for solid propellant targets were analyzed in the BMDS PEIS (MDA, 2007a). The BMDS PEIS concluded that pre-launch activities would have no impact on air quality, air space, biological resources, geology and soils, hazardous materials and waste, health and safety and noise. Impacts on local traffic from pre-launch target and support equipment shipments were not expected to be significant. Adherence to existing policies and procedures would minimize impacts on water resources.

General pre-launch site preparation and construction activities for land-based launches were addressed in the BMDS PEIS and this analysis tiers from the PEIS as appropriate for the specific sites at which these activities are proposed to occur for FTF target launches (i.e., KLC, Vandenberg AFB, USAKA/RTS, and Wake Island).

Pre-launch activities for liquid propellant targets were analyzed in the WSMR, New Mexico LPT EA (MDA, 2002a). In the WSMR, New Mexico LPT EA, pre-launch propellant loading operations were found to have no significant impact on air quality, hazardous materials and waste, and health and safety. The WSMR EA indicated that only very small amounts (approximately 10 grams [0.4 ounce]) of oxidizer vapors would be released to the atmosphere during the oxidizer transfer operation. A negligible amount of fuel vapors would also be released into the atmosphere during fuel transfers. The WSMR EA concluded that normal propellant loading operations would not impact air quality. No impacts were anticipated on airspace, biological resources, cultural resources, geology and soils, land use, noise, infrastructure, or water resources from pre-launch activities associated with liquid propellant targets.

Launch. The launch of liquid and solid propellant targets from land-based platforms has been addressed in numerous NEPA analyses. Exhibit ES-2 provides an overview of the previous NEPA analyses addressing launches of solid and liquid propellant targets from the seven proposed FTF land launch locations. This overview focuses on the largest liquid and solid propellant target launched from each location and associated NEPA documentation. Additionally, the Exhibit displays the FTF targets proposed for launch from each land location.

Exhibit ES-2. Overview of FTF Targets and Existing NEPA Analyses

Launch or Staging Location	FTF Targets Proposed for Launch	Previous NEPA Analysis for Liquid Propellant Target Launch	Previous NEPA Analysis for Solid Propellant Target Launch
Fort Wingate	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73. Largest solid propellant target is SR19/SR19 (12,476 kg (27,505 lb)	N/A	Launch of representative 2-stage target missile (M57A-1/M56A-1) with total propellant mass 6,370 kg (14,020 lb) TMD ETR EIS
Vandenberg AFB	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2, LV-3. Largest solid propellant target is LV-3 (43,258 kg (95,367 lb)	Launch of liquid propellant missile requiring ~ 907 kg (2,000 lb) of main fuel, 2,930 kg (6.456 lb) of oxidizer and 27 kg (60 lb) of initiator fuel analyzed in Liquid Propellant Missile Site Preparation and Launch EA	Launch of the 4-stage Peacekeeper target with total propellant mass 76,930 kg (169,250 lb) analyzed in GMD ETR EIS
WSMR	LPT; SR19. Largest solid propellant target is SR19 (6,238 kg (13,752 lb)	Launch of representative liquid propellant target requiring ~ 825 kg (1,815 lb) of main fuel, 2,920 kg (6,425 lb) of oxidizer and 30 kg (66 lb) of initiator fuel analyzed in the WSMR LPT EA	Launch of boosters including SR19-AJ-1 with total propellant mass 6,235 kg (13,750 lb) analyzed in the WSMR EIS
KLC	SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2, LV-3. Largest solid propellant target is LV-3 (43,258 kg (95,367 lb)	N/A – KLC's launch site operator license from the FAA does not permit the launch of liquid propellant missiles	Launch of four-stage Peacekeeper target with total propellant mass 76,930 kg (169,250 lb) analyzed in the GMD ETR EIS
PMRF	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73 Largest solid propellant target is SR19/SR19 (12,476 kg (27,505 lb)	Launch of Lance targets requiring ~ 170 kg (375 lb) of main fuel and 499 kg (1,100 lb) of oxidizer, and of Liquid Fueled Missiles requiring 825 kg (1,815 lb) of main fuel,	Launch of PAC-2, PAC-3 and THAAD analyzed in the PMRF Enhanced Capability EIS

Launch or Staging Location	FTF Targets Proposed for Launch	Previous NEPA Analysis for Liquid Propellant Target Launch	Previous NEPA Analysis for Solid Propellant Target Launch
		2,920 kg (6,425 lb) of oxidizer, and 30 kg (66 lb) of initiator analyzed in the PMRF Enhanced Capability EIS	
USAKA/RTS	SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2, LV-3 Largest solid propellant target is LV-3 (43,258 kg (95,367 lb)	N/A	Launch of GBI interceptor with propellant mass 20,500 kg (45,195 lb) from USAKA/RTS analyzed in the GMD ETR EIS
Wake Island	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2 Largest solid propellant target is LV-2 (25,591 kg (56,418 lb)	Launch of generic LPT requiring ~ 3,400 kg (7,500 lb) of main fuel, 12,000 kg (26,500 lb) of oxidizer and 120 kg (270 lb) of initiator fuel analyzed in the Wake Island SEA	Launch of Castor IVB 1st stage motor and M57A-1 2nd stage motor with total propellant mass 13,625 kg (29,975 lb) analyzed in the Wake Island EA

Post-launch. The impacts of post-launch activities for the FTF targets are anticipated to be the same post-launch activities that already occur for ongoing missiles launches and that have been previously analyzed in programmatic and site-specific environmental documents.

Sea Launches

Pre-launch. The use of Pearl Harbor as a ordnance loading location for the MLP was considered in the MLP EA. (MDA, 2004) The MLP EA concluded that no unusual or adverse impacts would be expected at Pearl Harbor because similar operations routinely occur at Pearl Harbor. The MLP EA also analyzed pre-launch activities related to the launch of solid and liquid propellant missiles including transportation of the MLP from the ordnance loading point to the test event location, fueling of liquid propellant missiles at the ordnance loading point or on the MLP, adding fins to the missile, and elevating the missile to the appropriate launch angle. A summary of pre-launch impacts is presented below.

Propellant loading procedures would specify any meteorological condition during which loading would not be permitted. Therefore, the MLP EA concluded that normal propellant loading operations would not impact air quality. The quantity of hazardous materials used and hazardous waste generated is not expected to significantly impact the generator status or current hazardous management and waste disposal practices at Pearl Harbor. Launches would be conducted in areas that would minimize the impacts to marine transportation. Health and safety standard operating procedures (SOPs) would be developed and implemented for target propellant loading onboard the MLP. Consequently, no adverse impacts on public health and safety would be expected from pre-launch activities for any targets on the MLP. Pre-launch activities would not be expected to pose a significant noise impact on the surrounding environment. Towing the MLP would result in minor releases of diesel fuel to water from the tow vessel. Additionally, the release of liquid propellants during propellant loading could result in limited emissions of nitric acid through the release of inhibited red fuming nitric acid (IRFNA). However, the low levels of the emissions and the natural buffering capacity of the sea water combined with the strong ocean current would neutralize the reaction in a relatively short period of time. No significant impacts on airspace, biological resources, geology and soils, or transportation would be expected from pre-launch activities.

Launch. The MLP EA analyzed the launch of solid and liquid propellant targets from the BOA. Emissions from launches would not be expected to adversely affect air quality in the BOA. Clean Air Act permitting requirements do not apply to the BOA and therefore would not be affected by the proposed launches. Because the airspace in the Pacific BOA is not heavily used, impacts on controlled and uncontrolled airspace would be minimal. No significant impacts on over-water airways and jet routes would be expected because the MLP would be positioned to avoid the en route and jet routes that cross the North Pacific Ocean. The potential for biological impacts on plankton and nekton exists when FTF targets fall into the ocean. The density of marine species, including marine mammals generally decreases, and the corresponding probability of impact from activities onboard the MLP decreases, as the distance from the shore increases. No significant impacts would be expected on biological resources from noise associated with target launches from the MLP. No impacts on geology and soils, hazardous materials and waste, or noise impacts on humans or marine mammals would be expected from any target launch onboard the MLP. Launch activities from the MLP would not take place close to any landmass; therefore members of the public would not be exposed to any hazards. Safety procedures would be employed to determine that impact areas are clear of surface vessels to ensure that no impact on ocean transportation would occur. No impacts would be expected on water resources from target launches.

Post-launch. The MLP EA analyzed the impacts of post-launch activities including a visual inspection of the desk area, collection any debris on the deck, and return of the MLP to the ordnance loading port or home port as appropriate. Transporting the MLP from the launch location in the BOA would result in a small amount of localized vehicle emissions. However, the winds in the BOA would disperse any minor emission amounts. No impacts on airspace, geology and soils, hazardous materials and waste, health and safety, or noise would be expected from post-launch activities. The natural buffering capacity of sea water and the strong currents would neutralize any released liquid propellants. Therefore, impacts on biological resources would be minimal. Post-launch activities would not be expected to impact transportation. Although washing the deck with freshwater following a launch may result in temporary localized decrease in the salinity of the ocean water near the MLP, post-launch activities would not be expected to adversely impact water quality.

Air Launches

Pre-launch. The Long Range Air Launch Target (LRALT) EA discusses pre-launch staging activities at PMRF including final system checks, storage of the target for 7 to 10 days, attaching the target to the pallet, and loading of the target onto a C-17 aircraft. (MDA, 2002b) Based on the limited pre-launch activities that would occur at PMRF, the only resource area analyzed in the LRALT EA was health and safety. The LRALT EA concluded that preflight preparations involving aircraft support and missile system final checks represent routine activities at PMRF. The refueling of one aircraft and brief handling of one LRALT flight test missile would not cause a significant increase in current operations or risks to health and safety. Because the activities at all staging locations are assumed to be the same, no impacts on public or occupational health and safety would be expected at Elmendorf AFB, Alaska; Misawa AB, Japan; YPG, Arizona; and Hill AFB, Utah.

Launch. The potential environmental consequences of launching a SR19/SR19 target from a C-17 aircraft over the Pacific BOA were analyzed in the LRALT EA. (MDA, 2002b) The LRALT EA concluded that the combined release of hydrogen chloride (HCl), aluminum oxide (Al_2O_3), nitrogen oxides (NO_X) and Halon 2402 emissions in the upper atmosphere due to a single LRALT flight test would be insignificant because of the rapid dispersion expected for such small quantities of substances. Therefore, they would not have a significant impact on stratospheric ozone. Impacts on biological resources, especially marine mammals and sea turtles, could occur from acoustic and non-acoustic effects. The LRALT EA concluded that the proposed LRALT flight test would have no discernable or measurable effect on the ocean's overall physical and chemical properties, and thus would have no impacts on the overall marine biology of the BOA ROI. Impacts on airspace were determined to be minimal. The LRALT EA determined that launch of an SR19/SR19 target would cause no adverse impacts on public health or safety in the BOA.

Post-launch. The impacts of post-launch activities for the FTF air launch targets are anticipated to be the same post-launch activities that already occur for ongoing missiles launches and that have been previously analyzed in programmatic and site-specific environmental documents.

Environmental Impacts

Exhibit ES-3, Summary of Environmental Impacts from the Proposed Action and Alternatives, presents a summary of the impacts from FTF Program activities on 13 resource areas for activities that had not been previously addressed in NEPA analyses. This summary discusses impacts from transportation of the FTF target to the launch or staging location; site preparation and construction; pre-launch, launch and post-launch activities at land launch locations; and pre-launch staging activities at sea and air launch staging locations. Impacts for launch and post-launch activities for sea and air launches of FTF targets are identified in the sections discussing impacts on the BOA and the Upper Atmosphere.

Land launch locations with site preparation and construction include KLC, VAFB, USAKA/RTS, and Wake Island. Land launch sites that do not require site preparation and construction include PMRF, WSMR, and FWAD. Pearl Harbor is the sea launch staging location for FTF targets. Air launch staging locations for FTF targets include YPG, Hill AFB, Elmendorf AFB, Misawa AB, and PMRF.

Exhibit ES-3. Summary of Environmental Impacts from the Proposed Action and Alternatives

Resource Area	Proposed Action	Alternative 1	No Action Alternative
Air Quality	**Transportation:** Impacts on air quality from transportation could occur from truck and air transport of the target to the launch/staging location. The total emissions, hydrocarbon (HC), CO, NO_X, and sulfur oxides (SO_X), from air transport shipments from Redstone Arsenal to each of the launch/staging locations would be less than any Federal *de minimis* quantities. Redstone Arsenal is located in attainment for all Federal National Ambient Air Quality Standards (NAAQS). Transportation emissions would not result in a significant impact on air quality at Redstone Arsenal or any of the launch/staging locations. Emissions of volatile organic compounds (VOCs), CO, NO_X, particulate matter (PM_{10}), and SO_X from truck transport would also be below Federal *de minimis* levels and would not cause significant impacts on air quality at any of the launch/staging locations. **Site Preparation and Construction:** Pre-launch preparation and construction activities could increase levels of PM_{10} and exhaust emissions. Best management practices would be employed to reduce fugitive dust emissions. The total emissions from ground disturbing activities at the four construction sites would be considerably below any Federal *de minimis* levels, and therefore, impacts on air quality would not be significant. **Land Launch:** Negligible amounts of propellant vapors could be released during propellant transfers. Most launch emissions would be dispersed by wind and would not significantly affect local or regional air quality. Other pre-launch and post-launch activities would be routine at all of the land launch locations and would not have significant impact on air quality.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Because the overall number of targets staged at air launch locations would not change, impacts to air quality from transportation would be as described for the proposed action. Potential air quality impacts from site preparation and construction, and land launch would be as described for the proposed action.	No transportation site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on air quality from the proposed action beyond those from existing programs in-progress at the proposed land launch and sea/air staging locations.
Airspace	**Land Launch:** Pre-launch and post-launch activities would have no significant impact on airspace because all transportation would be preformed in accordance with existing airspace use procedures. Following required scheduling and coordination procedures would minimize potential for adverse impacts on airspace from all launch activities.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential airspace impacts from land launch activities would be as described for the proposed action.	No pre-launch, launch, or post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on airspace from the FTF Program beyond those from existing programs in-progress at the proposed land launch locations.

Resource Area	Proposed Action	Alternative 1	No Action Alternative
Biological Resources	**Site Preparation and Construction:** There would be no significant impacts on biological resources from ground disturbance and construction noise. The 0.011 hectare (0.027 acre) of hairgrass-mixed forb meadow that would be lost at KLC does not contain any listed plant species. Additionally, this is a common habitat; therefore, habitat loss would not be significant. Most construction at Vandenberg AFB would occur within the footprint of existing infrastructure. Prior to trench construction, surveys would be performed to determine a trench design that would avoid impacts to threatened or endangered species. Construction at Meck Island and Wake Island would occur within the footprint of existing infrastructure, requiring little to no additional ground disturbance. **Land Launch:** The presence of launch-related personnel prior to launch, launch noise and launch emissions could impact biological resources during launch; however, launches are relatively infrequent and would not be expected to significantly impact biological resources. Limited post-launch activities would have no adverse effects on local vegetation or wildlife at any of the proposed launch locations.	Under alternative 1 launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts to biological resources from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts to biological resources from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.
Cultural Resources	**Site Preparation and Construction:** No construction activities or infrastructure modifications at any of the proposed launch sites are expected to have an effect on any historic properties or other cultural resources. At Vandenberg AFB, all ground-disturbing activities and infrastructure modifications would occur in accordance with the Integrated Cultural Resources Management Plan. No adverse impacts on cultural resources are anticipated at KLC, Vandenberg AFB, USAKA/RTS Meck Island, or Wake Island. **Land Launch:** The only potential impact on cultural resources from launch activities would be as a result of debris generated by a launch failure. The possibility of this occurring is remote. Additionally, personnel on site for pre- and post-launch activities would be reminded of the sensitivity of cultural resources and the issues of inadvertently damaging or destroying such resources. No adverse impacts on cultural resources would be expected.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts on cultural resources from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on cultural resources from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.

Resource Area	Proposed Action	Alternative 1	No Action Alternative
Geology and Soils	**Site Preparation and Construction:** Potential impacts on geology and soils would consist of soil and ground disturbing activities and the potential for leaks and spills associated with the proposed action. There are no geologic features at any of the launch locations that would be impacted by site preparation and construction activities. Proposed construction activities would result in minimal short- and long-term impacts due to soil disturbance. Best management practices would be used to minimize erosion and siltation of nearby water bodies. Large spills or leaks would be handled in accordance with standard spill response protocols; therefore, any potential soil contamination impacts would be contained and would not be significant. **Land launch:** The increase in HCl from target launches has the potential to increase acidity at the land launch locations. However the limited number of FTF launches proposed at each launch site would minimize the addition of HCl to soils. No significant impacts on geology and soils would be expected from the launch of FTF targets.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts on geology and soils from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on geology and soils from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.
Hazardous Materials and Waste	**Land launch:** The types of hazardous materials used and waste generated at all the land launch locations would be similar to those currently used and generated. All land launch locations have standard operating procedures to minimize the hazards associated with storing, handling, and transporting target missile components and other hazardous materials. All applicable regulations and operating procedures would be followed and would prevent impacts from improper transport, management, or disposal of hazardous materials or hazardous waste. **Air Launch:** Potential impacts could occur from storage, use, and eventual disposal of small quantities of hazardous materials and waste associated with the FTF Program. Staging locations would follow all applicable Federal and state regulatory compliance requirements; therefore, no impacts from the management of hazardous materials and wastes would be expected.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Because the overall number of targets staged at air launch locations would not change, impacts on hazardous materials and waste from air launch activities would be as described for the proposed action. Potential impacts on hazardous materials and waste from land launch activities would be as described for the proposed action.	No pre-launch, launch, or post-launch activities related to the proposed action would occur; therefore, there would be no hazardous materials and waste from the proposed action beyond those from existing programs in-progress at the proposed land launch and air staging locations.
Health and Safety	**Site Preparation and Construction:** Potential impacts on the health and safety of workers could occur as a result of accidents and exposure to air emissions and hazardous materials/waste. Potential impacts to the public could occur as a result of air emissions. General safety procedures would be followed to protect construction workers and launch location	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Because the overall number of targets	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on health and

Resource Area	Proposed Action	Alternative 1	No Action Alternative
	employees. Impacts to the public would not be significant because regional air quality would not be adversely affected by fugitive dust or construction vehicle emissions. **Land Launch:** Potential impacts on health and safety from FTF target launches would include exposure to explosives, contact with launch debris, and exposure to noise produced during launch. All land launch locations have restricted access; therefore, the public would be prevented from exposure to these hazards. Following proper procedures during propellant loading and pre-launch operations would reduce potential impacts. On-site personnel would be protected from launch event hazards; therefore, no significant health and safety impacts would be expected. No significant impacts would be expected from post-launch activities. **Air Launch:** Potential impacts could occur from the loading of hydrazine into the LV-2 target attitude control system. A safety briefing would be held prior to propellant loading. In the extremely unlikely occurrence of a leak/spill, approved emergency response plans would be implemented. No significant impacts from staging activities would be anticipated.	staged at air launch locations would not change, impacts to health and safety from air launch activities would be as described for the proposed action. Potential impacts on health and safety from site preparation and construction and land launch would be as described for the proposed action.	safety from the proposed action beyond those from existing programs in-progress at the proposed land launch and air staging locations.
Land Use	**Site Preparation and Construction:** The majority of the proposed site preparation and construction would occur in previously disturbed areas on existing military and commercial launch facilities. The proposed site preparation and construction activities are consistent with the missions of each of the four sites and would occur in accordance with existing land use plans, agreements, policies, or controls, resulting in no significant impacts. **Land Launch:** At all land launch locations, launch preparations would follow standard evacuation procedures of the launch vicinity. Any closures would be temporary and would not have an appreciable impact. There would be no land use issues associated with post-launch activities.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts on land use from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on land use from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.

Resource Area	Proposed Action	Alternative 1	No Action Alternative
Noise	**Site Preparation and Construction:** Construction would result in intermittent, short-term noise effects that would be temporary, lasting for the duration of the noise generating construction activities. The public would be excluded from the immediate vicinity of the construction site; therefore, the public would not be exposed to hazardous noise levels. Noise from construction and site preparation activities would comply with OSHA, applicable DoD Health and Safety regulations and guidelines, Range Safety requirements and any other standard operating procedures that involve construction and facility modifications. Impacts from noise would be expected to be not significant. **Land Launch:** The launch and flight of boosters would produce launch noise and sonic booms. The public would not be in proximity to launch sites and therefore would not be exposed to significant noise levels. Launch personnel would leave the area, seek shelter in the Launch Control Center, or wear recommended hearing protection. Therefore, no significant noise impacts would be expected.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential noise impacts from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional noise impacts from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.
Socioeconomics and Environmental Justice	**Site Preparation and Construction:** Potential socioeconomic impacts could occur as the result of the influx of temporary construction personnel (50) to the launch sites. The four proposed launch sites requiring construction would be able to meet the housing needs of temporary personnel; therefore, this would not result in a significant socioeconomic impact. Short-term air emissions and noise impacts associated with the proposed action would not have a disproportionately high and adverse effect on minorities or low income populations located at any of the four sites. **Land Launch:** All land launch sites would be able to meet the housing needs of additional personnel. The proposed launch activities would not cause displacement or other significant impacts to populations, residences, or local businesses at any of the proposed land launch sites. Short-term air emissions and noise impacts associated with the proposed action would not have a disproportionately high and adverse effect on minorities or low income populations at any of the land launch sites.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts on socioeconomics and environmental justice from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on socioeconomics and environmental justice from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.

Resource Area	Proposed Action	Alternative 1	No Action Alternative
Transportation	**Site Preparation and Construction:** Construction equipment would be transported to the launch locations by ocean carrier, plane, or truck. All launch locations are equipped to accommodate the increased level of traffic; these activities would be routine and would not impact transportation systems. Movement of construction equipment and materials may cause temporary traffic delays; however, these delays would be infrequent. Impacts from the temporary increase in construction personnel would be temporary and would not be expected to have a significant adverse effect on ground transportation. **Land Launch:** Impacts on traffic due to temporary road closures are not expected to be significant. Notices to Airmen (NOTAMs) and Notices to Mariner (NOTMARs) would prevent significant impacts on air and marine transportation.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts on transportation from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on transportation from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.
Visual Resources	**Site Preparation and Construction:** The placement of any new infrastructure at the four sites would occur in a previously altered visual landscape adjacent to existing launch facilities. Therefore, no significant impacts on visual resources would be anticipated. **Land Launch:** Based on the brevity of launch events and the infrequency of FTF target launches at each of the land launch locations, FTF target launch would not significantly impact the visual landscape at any of the proposed land launch locations.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts on visual resources from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on visual resources from the proposed action beyond those from existing programs in-progress at the proposed land launch locations.
Water Resources	**Site Preparation and Construction:** Construction activities could result in short-term impacts on nearby water bodies. Best management practices and other standard operating procedures would be used during site preparation and construction activities to minimize erosion, storm water pollution, and other impacts that could adversely impact surface water quality. Applicable permits would be obtained and spill response protocols would be developed before commencing construction. **Land Launch:** Following appropriate procedures during propellant loading operations would reduce the potential for impacts on water quality. Emissions of HCl and aluminum oxide could temporarily alter local surface water chemistry; however, these emissions would be diluted	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. Potential impacts on water resources from site preparation and construction and land launch would be as described for the proposed action.	No site preparation and construction, or pre-launch, launch, and post-launch activities related to the proposed action would occur; therefore, there would be no additional impacts on water resources from the proposed action beyond those from existing programs in-progress at the proposed land launch and locations.

Resource Area	Proposed Action	Alternative 1	No Action Alternative
	and dispersed by receiving waters and would not be expected to pose significant impacts on water resources at any of the land launch sites.		
Broad Ocean Area	Winds from the BOA would disperse any surface level emissions. Any trace levels of pollutants, propellants or target debris deposited into the BOA would be immediately diluted. Injury to any marine mammal by direct impact or shock wave impact would be extremely remote. NOTMARs and NOTAMs would be issued as appropriate to inform mariners and airmen about a launch and the launch hazard area. Range Safety would clear affected airspace and open ocean to prevent any impact on the public or transportation in the launch hazard area. In the event of a flight termination, the possibility of debris impacting a sea vessel would be remote. There would be no significant impacts on any resource area in the BOA from proposed FTF launch activities.	Under alternative 1, launches of the LV-2 and SR19/SR73 targets would not be conducted from air-based platforms, but launches of other FTF targets would occur from air-based platforms. Because the overall number of targets launched into the BOA would not change, impacts to the BOA would be as described for the proposed action.	No launch activities related to the proposed action would occur; therefore, there would be no additional impacts to the BOA from the proposed action beyond those from existing programs in-progress.
Upper Atmosphere	Emissions of HCl and Al_2O_3 from launches of FTF targets would be less than those released by a single Space Shuttle launch, and on a global scale the level of emissions would not be statistically significant. Emissions of NO_X produced in the exhaust plume of FTF targets would represent a very small fraction of NO_X species generated, and this would not have a significant effect on ozone levels. Because the emissions of HCl, Al_2O_3, and NO_X from launches of FTF targets would be relatively small compared to emissions released on a global scale, the large air volume over which these emissions are spread, and the rapid dispersion of the emissions by stratospheric winds, launches of FTF targets would not have a significant impacts on stratospheric ozone.	Under alternative 1, launches of LV-2 and SR19/SR73 would not be conducted from air-based platforms. but launches of other FTF targets would occur from air-based platforms. Because the overall number of targets launched into the Upper Atmosphere would not change, potential impacts to the Upper Atmosphere would be as described for the proposed action.	No launch activities related to the proposed action would occur; therefore, there would be no additional impacts to the Upper Atmosphere from the proposed action beyond those from existing programs in-progress.

Cumulative Impacts

The MDA has determined that no cumulative impacts would be associated with providing a Flexible Target Family (FTF) to support the testing of the Ballistic Missile Defense System (BMDS).

MDA considered the cumulative impacts of the transportation of FTF targets by ground from the target integration facilities in Alabama to Redstone Arsenal, transportation by air from the Redstone Arsenal Army Airfield to the launch and staging locations, and the pre-launch, launch, and post-launch FTF target activities that would occur at specific land launch locations that already support MDA target launches and staging locations on existing air bases worldwide.

Under the proposed action, it was conservatively estimated that up to 20 roundtrip target shipments would originate from either the Courtland Target Assembly Facility in Lawrence County, Alabama (for solid propellant targets) or from the Lockheed Martin Target Missile Systems facility (for liquid propellant targets) and travel by ground to Redstone Arsenal in Huntsville, Madison County, Alabama. Those 20 roundtrip target shipments would add up to a maximum of 240 truck roundtrips over 63 kilometers (43 miles) per year and would increase the number of landings and takeoffs into and out of Redstone Arsenal Army Airfield by up to a maximum of 320 extra flights per year. As described in Chapter 4, the total emissions from those additional truck roundtrips and flights would not create significant impacts on air quality. Therefore, there would be no cumulative impacts from the transportation of up to 20 FTF targets per year from the FTF target integration facilities to Redstone Arsenal and then on to the launch/staging locations.

Four of the land launch sites included site preparation and construction as part of the pre-launch activities – KLC, Vandenberg AFB, USAKA/RTS (Meck Island), and Wake Island. The remaining land launch sites, PMRF, WSMR, and FWAD, had no site preparation or construction requirements. The cumulative impacts of the transport, pre-launch, launch and post-launch activities using FTF targets at all land launch locations were found to be not significant as discussed for each land launch site in the EA.

MDA also considered the cumulative impacts of the transport and staging of FTF targets at various locations worldwide to accommodate air and sea launch target requirements. These staging locations are: YPG, Arizona; Elmendorf AFB, Alaska; Hill AFB, Utah; Misawa AB, Japan; and Pearl Harbor, Hawaii. All proposed staging locations are operational military bases and routinely carry out such activities. The addition of one FTF target transported to and staged from these locations annually was determined to be not significant.

The proposed action would have no significant cumulative effects on the BOA which would be the major receptor for either the intact target or debris and jettisoned expended rocket motors from all launch platforms except WSMR and FWAD. Target launches are short-term, discrete events that would occur at different times of the year, and FTF target launches would not result in increased launch events as the targets replace the existing target inventory in the BMDS testing program.

These activities involving FTF targets would support the MDA's BMDS test and development program as addressed in the BMDS PEIS. The FTF targets considered in this EA would be used as targets in projected future test launch activities and therefore MDA assumed no launches in addition to the 515 launches considered during the 10-year period already evaluated in the BMDS PEIS. This analysis determined that cumulative impacts of worldwide launches from various land, sea and air launch platforms were expected to be less than significant on the atmosphere in terms of global warming and ozone depletion. For all resource areas, MDA reviewed the activities considered in this EA and concluded that there would be no significant cumulative impacts.

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
AADC	Alaska Aerospace Development Corporation
AAQS	Ambient Air Quality Standards
AB	Air Base
ABV	Alternate Boost Vehicle
ACM	Avionics Control Module
ACS	Attitude Control Section
ACQR	Air Quality Control Region
ADEQ	Arizona Department of Environmental Quality
AFB	Air Force Base
Al_2O_3	Aluminum Oxide
AMHS	Alaska Marine Highway System
ARTCC	Air Route Traffic Control Center
AST	Aboveground Storage Tank
BMDS	Ballistic Missile Defense System
BOA	Broad Ocean Area
CO	Carbon Monoxide
CAA	Clean Air Act
CE	Common Erector
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CHRIMP	Consolidated Hazardous Materials Reutilization and Inventory Management Program
Cl	Chlorine
CNEL	Community Noise Equivalent Level
CSE	Common Support Equipment
CT	Common Transporter
CTES	Common Transport and Erections System
CTS	Common Test Set
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted decibels
DNL	Day/Night average sound Level
DoD	Department of Defense
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EOC	Emergency Operations Center

EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
ETR	Extended Test Range
FAA	Federal Aviation Administration
FL	Flight Level
FPPA	Farmland Protection Policy Act
FTF	Flexible Target Family
FTS	Flight Termination System
FWAD	Fort Wingate Army Depot
GBI	Ground-Based Interceptors
GMD	Ground-Based Midcourse Defense
HAP	Hazardous Air Pollutant
HC	Hydrocarbons
HCl	Hydrogen Chloride
Hz	Hertz
ICAO	International Civil Aviation Organization
IDOC	Initial Defensive Operations Capability
INRMP	Integrated Natural Resources Management Plan
IRFNA	Inhibited Red Fuming Nitric Acid
JEGS	U. S. Forces Japan, Environmental Governing Standards
kg	kilograms
KLC	Kodiak Launch Complex
lb	pounds
LHA	Launch Hazard Area
LPT	Liquid Propellant Target
LPM	Liquid Propellant Missile
LRU	Line Replaceable Unit
MBRV	Modified Ballistic Reentry Vehicle
MDA	Missile Defense Agency
MLP	Mobile Launch Platform
National Register	National Register of Historic Places
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NOTAM	Notice to Airmen
NOTMAR	Notice to Mariners
ODCs	Ozone-depleting chemicals
OSHA	Occupational Safety and Health Administration
Pb	Lead
PAC-3	PATRIOT Advanced Capability-3
PCB	Polychlorinated Biphenyl

PEIS	Programmatic Environmental Impact Statement
$PM_{2.5}$	Particulate Matter with a diameter less than 2.5 microns
PM_{10}	Particulate Matter with a diameter less than 10 microns
PMRF	Pacific Missile Range Facility
RCRA	Resource Conservation and Recovery Act
RMI	Republic of the Marshall Islands
ROI	Region of Influence
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMDC	U.S. Army Space and Missile Defense Command
SO_X	Sulfur Oxides
SOP	Standard Operating Procedure
SPCC	Spill Prevention Control and Countermeasures
SRV	Small Reentry Vehicle
SSDC	U.S. Army Space and Strategic Defense Command
STARS	Strategic Target Systems
TAFT	Transport and Fueling Trailer
TEL	Transporter Erector Launcher
THAAD	Terminal High Altitude Area Defense
TMD	Theater Missile Defense
TRACON	Terminal Radar Approach CONtrol
UES	USAKA Environmental Standards
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAKA/RTS	United States Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds
WILC	Wake Island Launch Center
WSMR	White Sands Missile Range
YPG	Yuma Proving Ground

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1 PURPOSE AND NEED

1.1 Background

The National Environmental Policy Act (NEPA) of 1969, as amended; the Council on Environmental Quality (CEQ) regulations which implement NEPA (Code of Federal Regulations [CFR], Title 40, Parts 1500-1508); Department of Defense (DoD) Instruction 4715.9 Environmental Planning and Analysis; applicable service environmental regulations; and Executive Order (E.O.) 12114, *Environmental Effects Abroad of Major Federal Actions* direct DoD lead agency officials to consider potential environmental impacts and consequences when authorizing or approving Federal actions. E.O. 12114 requires environmental consideration for actions that may significantly affect the environment outside the United States (U.S.), its territories and possessions.

The Missile Defense Agency (MDA) prepared this Environmental Assessment (EA) to assess the environmental impacts of providing a Flexible Target Family (FTF) to support the testing of the Ballistic Missile Defense System (BMDS). Target missiles are used to test the BMDS by imitating threat missiles. They are typically composed of one or more rocket motors (also known as boosters or stages) and a front section. The FTF would consist of a collection of common boosters, front sections, and components that could be used to assemble a variety of different target configurations. The FTF also would include transportation, testing and handling equipment for the assembled targets.

Previously, target components manufactured at various facilities throughout the U.S. were delivered to the launch site for target assembly, integration and check-out just prior to launch. MDA consolidated these actions by making the decision to develop a single integration capability for some solid propellant boosters at the Lockheed Martin Space Systems Company Courtland, Alabama Integration Facility. This action was analyzed in the Courtland Target Assembly Facility EA. (MDA, 2006)

Developing the FTF would further streamline the target production process by designating common core boosters, front sections, and components that could be used interchangeably to develop targets to support BMDS testing. These FTF targets would use existing surplus motors. MDA would maximize efficiency by using these common components where possible in the FTF, but would ensure maximum flexibility to support testing by developing specific front sections that imitate realistic threat missiles.

The solid propellant FTF targets would be assembled, integrated and checked out at the expanded Courtland Facility and liquid propellant FTF targets would be assembled, integrated and checked out at the Lockheed Martin Space Systems Company Target Missile Systems facility in Huntsville, Alabama. The assembled targets would be transported from these facilities to the appropriate launch/staging location, where they would undergo final assembly, fueling (as necessary), and check-out of the target before launch.

1.2 Purpose and Need

The purpose of the proposed action is to provide a flexible family of targets that can be used to test MDA's BMDS under increasingly realistic scenarios. The FTF would streamline MDA's target development and acquisition process and would provide additional flexibility by using common processes and procedures to assemble a standardized inventory of target boosters, front sections, and components.
The FTF would fulfill MDA's need to have access to targets that mimic realistic threat missiles and can be used to test the BMDS. The use of common core components for reentry vehicles, instrumentation, countermeasures, boosters, and ground support equipment would increase target system reliability, minimize cost, and reduce cycle time. This would facilitate MDA's mission by reducing the time required to produce targets needed to test BMDS capabilities.

1.3 Scope

This EA considers the development, preparation, assembly, integration, testing, transportation, and use of FTF targets to support BMDS testing. Development would consist of the conceptual and physical development of new boosters and FTF targets or technologies. Preparation would consist of pre-assembly work and in some cases minor modifications to motors. Assembly, integration and testing of targets using solid rocket motors would be completed at the Lockheed Martin Space Systems Company Courtland, Alabama Target Integration Facility; liquid propellant motors would be handled at the Lockheed Martin Target Missile Systems facility. If necessary, the targets could be stored at the integration facility in the short term for up to one year. The assembled targets would be transported by truck, aircraft and barge[1] to the launch/staging sites.

The use of the FTF targets can be further broken down in to pre-launch, launch, and post-launch activities. *Pre-launch* activities for **land** launches would include site preparation and construction, short term storage of the target, pad setup, final integration and testing of the target, clearing the range area, fueling the target and other range requirements prior to launch, as appropriate. *Pre-launch* activities for **sea** and **air** launches would occur at staging locations and include all of the above activities except site preparation and construction. *Launch* activities include the launch and flight of the target, beginning with first stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept (some missions), and debris generation. *Post-launch* activities would consist of debris clean up including minor refurbishment of the launch stand, pad,

[1] The barge transport mode would only be used for the approximately 29 kilometers (18 miles) from Kwajalein to Meck Island.

or rails, potential recovery, and transport of the support equipment to the appropriate storage facility.

The potential effects of activities not previously analyzed are considered (e.g., site-specific site-preparation and construction activities) in this EA. However, all other activities that have been previously analyzed as tiered from the BMDS Programmatic Environmental Impact Statement (PEIS) and as incorporated by reference in site specific NEPA analyses are not considered further in this EA. Also the specific details of future tests that would use FTF targets are not known, therefore, the potential impact of future test scenarios are not analyzed in this EA.

1.4 Relevant Environmental Documentation

Relevant previous NEPA analyses are identified below. This EA tiers from the BMDS PEIS. Relevant information has been summarized from the documents identified below as appropriate and cited for baseline environmental resource areas in Section 3 and for environmental impact determinations in Section 4. To facilitate a review of the analyses in these documents they have been made available at the following website http://www.mda.mil/mdalink/html/enviro.html.

- Federal Aviation Administration. EA of the Kodiak Launch Complex, May 1996.
- MDA. BMDS PEIS, January 2007.
- MDA. Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Environmental Impact Statement (EIS), July 2003.
- MDA. Mobile Launch Platform (MLP) EA, June 2004.
- MDA. White Sands Missile Range (WSMR), New Mexico Liquid Propellant Targets (LPT) EA, May 2002.
- MDA. Wake Island Supplemental EA, February 2007.
- MDA. Courtland Target Assembly Facility EA, November 2006.
- MDA. Mobile Sensors EA, September 2005.
- MDA. Liquid Propellant Missile (LPM) Site Preparation and Launch EA, July 2002.
- MDA. GMD Initial Defensive Operations Capability (IDOC) at Vandenberg Air Force Base (AFB) EA, August 2003.

- MDA. Alternate Boost Vehicle (ABV) Verification Tests EA, August 2002.
- MDA. Theater High Altitude Area Defense (THAAD) Pacific Test Flights EA, December 2002.
- U.S. Air Force. Final EA for the Orbital/Sub-Orbital Program, July 2006.
- U.S. Army Space and Strategic Defense Command (SSDC). Strategic Target Systems (STARS) EA, July 1990.
- SSDC. Theater Missile Defense (TMD) ETR EIS, November 1994.
- U.S. Department of the Navy. Pacific Missile Range Facility Enhanced Capability EIS, December 1998.
- U.S. Department of the Air Force. Minuteman III Propulsion Replacement Program, Hill AFB, Utah EA, August 2001.
- WSMR. WSMR, Range-wide EIS, January 1998.

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The proposed action is to provide the FTF, which would consist of common target components and common ground support equipment, to support the BMDS testing program. The following subsections describe the activities that comprise the proposed action including the development, preparation, assembly, integration, testing, transport, and use of FTF targets including pre-launch, launch and post-launch activities. Also described are the locations where these activities would occur.

2.1 Flexible Targets Family

The FTF would consist of common target components and ground support equipment. Targets are typically composed of one or more rocket motors (also known as boosters or stages) and a front section. Adapters or interstages separate the individual motors and also the motors from the front section of the target. Within the FTF, a collection of common boosters and interstage front section components would be used to assemble targets with different flight capabilities. The FTF front section components would include reentry vehicles, avionics control modules, and payload deployment modules. Common payload deployment modules could contain sensors, countermeasures, and simulants. These sensors, countermeasures, and simulants would be specific to the test being supported and would be analyzed as appropriate in subsequent environmental analysis for specific tests. The use of common components would streamline the target production process.

The FTF is envisioned to include at least eight different targets. Each target would be comprised of one, two, or three stages that could use liquid or solid propellant motors. The total propellant quantities for these eight vehicles range from approximately 3,775 kilograms (8,306 pounds) to 43,258 kilograms (95,367 pounds). The FTF targets may be land-, sea-, or air-launched, depending on the specific target configuration and mission requirements.

The FTF targets also would include reentry vehicles that would imitate threat missile payloads. These reentry vehicles would be specifically configured for each test that an FTF target would be used to support. MDA would maximize efficiency by using common components where possible in the FTF, but would ensure maximum flexibility for testing by developing specific reentry vehicles and target signatures that imitate realistic threat missiles. .Currently four Modified Ballistic Reentry Vehicles (MBRV-1, -2, -3, -4) are currently in use or under development by MDA. Additionally, the Small Reentry Vehicle (SRV) may be developed and flown in the future. All four MBRVs include an external structure and contain some level of instrumentation. Although the MBRV's mass, materials, and stimulated payload may differ to represent different threats, from an environmental impacts perspective, all MBRVs would be similar.

Exhibit 2-1 shows representative target configurations that comprise the FTF as well as the platforms from which these targets would be launched. In addition to the propellants listed in Exhibit 2-1, SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 may use a liquid-fueled hot gas attitude control section (ACS).

Exhibit 2-1. Representative FTF Target Configurations and Launch Platforms

	LPT[1]	SR19	Castor IVB	SR19 M57	SR19 SR19	SR19 SR73	C-4 First Stage C-4 Second Stage	C-4 First Stage C-4 First Stage C-4 Second Stage
Common Name							LV-2	LV-3
Launch Platform[2]	L, S	L, A, S	L, A, S	L, A, S	L, A, S	L, A, S	L, A	L
Target Range	Short	Short	Intermediate	Intermediate	Intermediate	Intermediate	Long	Long
Existing Target Rocket	Yes	Yes	Yes	Yes	Yes	No	No	No
Propellant Type	Liquid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
First Stage Propellant Class[3]	N/A	Class 1.3	Class 1.3	Class 1.3	Class 1.3	Class 1.3	Class 1.1	Class 1.1
First Stage Propellant Quantity, kg (lb)[4]	3,775 (8,306)	6,238 (13,752)	9,975 (21,991)	6,238 (13,752)	6,238 (13,752)	6,238 (13,752)	17,667 (38,949)	17,667 (38,949)
Second Stage Propellant Class	N/A	N/A	N/A	Class 1.3	Class 1.3	Class 1.3	Class 1.1	Class 1.1
Second Stage Propellant Quantity, kg (lb)	N/A	N/A	N/A	1,659 (3,657)	6,238 (13,752)	3,111 (6,859)	7,924 (17,469)	17,667 (38,949)
Third Stage Propellant Class	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Class 1.1
Third Stage Propellant Quantity, kg (lb)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7,924 (17,469)
Total Propellant Quantity, kg (lb)	3,775 (8,306)	6,238 (13,752)	9,975 (21,991)	7,897 (17,410)	12,476 (27,505)	9,349 (20,611)	25,591 (56,418)	43,258 (95,367)

1 Liquid Propellant Target (LPT) is the only liquid propelled target in the FTF and is not assembled and integrated at the Courtland Target Facility.

2 Launch platforms: L=land; S=sea; A=air

3 Explosives are divided into classes to describe their hazard potential. For example, substances that have a mass explosion hazard are classified as Class 1.1; substances that pose a projection hazard, but not a mass explosion hazard are classified as Class 1.2; and substances that pose a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard are classified as Class 1.3. http://www.electromark.com/help/DOT/explosive_11_12_13.asp. accessed March 13, 2006

4 kg = kilograms; lb = pounds

The FTF also would include ground support equipment consisting of all transportation, handling, and testing equipment. The common ground support equipment used for solid propellant FTF targets would aid in the integration, transport, erection, service, and maintenance of the target during the assembly, integration and testing as well as during launch activities from land-, sea- and air-based platforms. The support equipment has three main categories

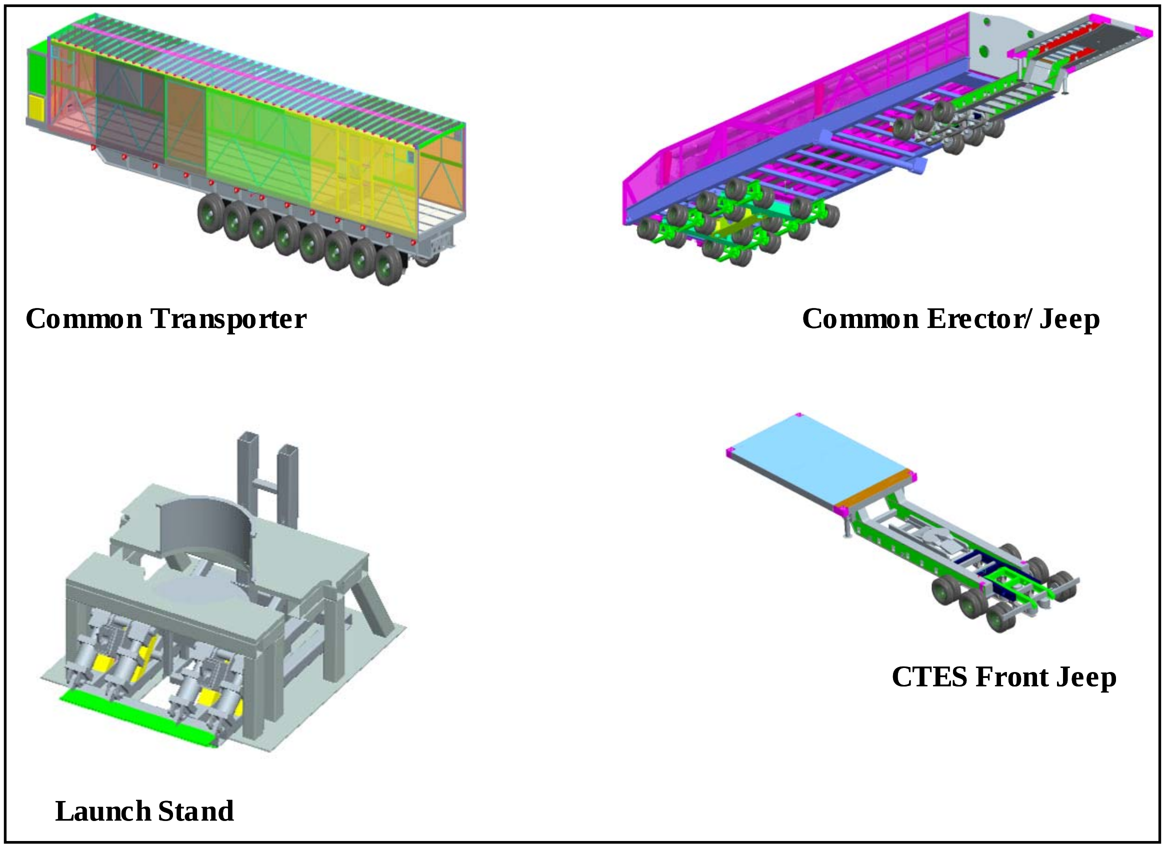
- Common transporter and erector system (CTES),
- Common support equipment (CSE), and
- Common test set (CTS).

The CTES consists of a Common Transporter (CT) and Common Erector (CE) designed to protect, transport and erect a fully assembled FTF launch vehicle. The CTES would also provide all required environmental controls at the launch site with the exception of the short duration after erection and prior to launch when thermal protection would be provided by a thermal rocket cover. At the launch pad, the CE is the common interface to the launch stand and will accommodate vehicle access while horizontal for

- Propellant Load,
- LRU replacement,
- Encryption hardware replacement, and
- Removal and installation of safing pins.

The CTES is transportable by air, sea, and over the road. Its major components are illustrated in Exhibit 2-2. Together these systems provide the capability to protect, transport and erect a fully assembled FTF target vehicle. The CT and CE would be designed and developed specifically to support solid propellant FTF targets. The CTES would consist of the CT, CE, launch stand, umbilical mast, and shipping/transportation dollies. The CTES would protect the target and provide limited access to the target during launch processing. The environmental control unit would condition the enclosure during transport and pre-launch activities until the unit is removed prior to launch. Environmental control units would be powered by generators during transport and by commercial power all other times. The CE would be shipped separately from the solid propellant FTF target and CT to the launch location. Solid propellant FTF targets would be loaded onto the CT prior to shipment from the Courtland Target Assembly Facility.

Exhibit 2-2. Major Components of the FTF CTES[1]



[1] The above figures represent preliminary designs. The major components of the FTF CTES are still in development.

The FTF CSE would consist of equipment to

- Handle the FTF target components during integration and transport and could include stands, lifting beams, restraints, and cranes;
- Access the FTF targets while at the launch site including fixtures and personnel stands;
- Service the FTF targets including fuel equipment and pressure carts;
- Environmentally condition the FTF targets using thermal rocket covers and air conditioning systems;
- Ship the FTF target to the launch/staging site and temporarily store the FTF target; and
- Provide the extraction system that would launch the FTF target during air launches.

The CTS for solid propellant FTF targets would consist of the necessary hardware and software to provide communication, control, and power to test and launch the solid propellant FTF targets. The CTS also would have the capability to record and monitor the status of the solid propellant FTF targets during checkout and launch operations. It would provide control of the FTF targets during final countdown in stopping, starting, holding, or recycling the count at any time prior to lift-off. The CTS would support the tests and checkout of the solid propellant FTF targets both at the integration facility and at the launch sites. Equipment used for component or sub-system testing that is common to the testing at the integration or launch sites also would be part of the CTS. Most CTS equipment would be housed in two transportable containers, a pad van, and a launch control van at the launch site. The vans would be sheltered and/or parked outside of the target explosive safety quantity distance (ESQD).

The liquid propellant FTF targets would not use the CT or the CSE but would be shipped using either government furnished equipment trailers including the Transport and Fueling Trailer (TAFT) or a Transporter Erector Launcher (TEL). This transportation support equipment is already used for launches of this target and has been previously analyzed in the WSMR, New Mexico LPT EA. (MDA, 2002a)

2.2 Development

Development activities for the FTF would include the conceptual and physical development of boosters and target components specific to the SR19/SR73, LV-2 and LV-3 targets. The other five targets proposed to be used as part of the FTF have already been used to support other MDA missions. In addition, the individual boosters proposed to be used in the SR19/SR73, LV-2 and LV-3 have been used in other configurations in the past. The SR19/SR73 target uses the SR19 and SR73 boosters. The SR19 booster has been used in many past configurations including STORM and Minuteman II. The SR73 booster is currently used as the third stage of the Minuteman III missile. The FTF LV-2 uses the C-4 first stage booster as its first stage and the C-4 second stage booster as its second stage. The LV-3 uses two C-4 first stage boosters as its first and second stages and a C-4 second stage booster as its third stage. The C-4 Trident has been previously analyzed in the GMD ETR EIS. (MDA, 2003a)

The C-4, SR19, and SR73 boosters are excess motors previously used in military launch configurations and were manufactured offsite in existing facilities that usually perform this type of production. The assembly and storage of the C-4 first stage, the C-4 second stage, SR19, and SR73 have been discussed in the Courtland Target Assembly EA (MDA, 2006), and the fabrication/assembly/testing of multistage targets has been previously analyzed in the STARS EA. (SSDC, 1990) These fabrication, assembly, and testing procedures may require the use of cleaning solvents, alcohol, and/or paint primer; materials routinely used in these installations and would be handled in accordance with applicable safety procedures. The use of solvents and sealants in target assembly has been addressed in the Courtland Target Assembly EA. Development activities would occur at facilities that currently perform these types of activities and the development of the FTF targets would not present any unique actions from those already conducted at these sites and determined not to result in any significant impacts. Therefore, development activities are not further detailed or analyzed in this EA.

2.3 Preparation and Transport to Single Integration Facility

Preparation activities for the FTF boosters and target components would consist of the storage, handling, and/or assembly of stages to prepare targets for transport to the Single Integration Facility for integration. All preparation operations would occur at facilities that employ environmental, safety, and health resources to ensure compliance and risk management. These preparation activities already occur at various facilities in the U.S. (e.g., Alliant Techsystems in Ogden, Utah; Orbital Sciences Corporation in Chandler, Arizona; Stennis Space Center, Mississippi; Strategic Weapons Facility Pacific in Bangor, Washington; Hill AFB, Utah; Promontory Point Utah; Camp Navajo, Arizona; and the Lockheed Martin Target Missile Systems in Huntsville, Alabama) and would not present any unique activities different from those already conducted at these sites or result in any significant environmental impacts. (SSDC, 1990) Therefore preparation activities are not described or analyzed in this EA.

Transportation of the solid propellant target components to the Single Integration Facility at Courtland was considered in the Courtland Target Assembly Facility EA, which is incorporated by reference herein. It was conservatively estimated that under surge assembly conditions, 20 targets per year consisting of three boosters and a front section, would be assembled at Courtland resulting in a maximum of 80 trips carrying boosters and target components from manufacturing and storage facilities to the Single Integration Facility and 80 return trips to origin with no cargo. Liquid propellant targets would be sent from storage at Redstone Arsenal to the Lockheed Martin Target Missile Systems facility for integration of the front section.

2.4 Assembly, Integration, and Testing

The Courtland Target Assembly Facility would be the Single Integration Facility from which solid rocket propellant FTF targets would be assembled, integrated, and tested. These activities are described and their potential environmental impact analyzed in MDA's Courtland Target Assembly Facility EA.

The LPT liquid propellant target would not be assembled, integrated, or tested at the Courtland Target Assembly Facility. Instead these targets would be shipped from storage at Redstone Arsenal to the Lockheed Martin Target Missile Systems facility to undergo final assembly and integration of the RV onto the liquid propellant target. The assembled unfueled liquid propellant target would then be shipped to the launch/staging location as required. The final assembly and integration of liquid propellant targets was analyzed in the White Sands Missile Range Liquid Propellant Targets EA. The assembly and integration of liquid propellant targets in at the Lockheed Martin Target Missile Systems facility would be expected to have similar and no greater effects than those described in the White Sands Missile Range Liquid Propellant Targets EA.

2.5 Storage

The FTF targets may require short-term storage at the Courtland Target Assembly Facility or the Lockheed Martin Target Missile Systems facility after target assembly if it is not possible to immediately ship the target to its launch/staging location. A fully assembled target could be stored on site at the Courtland Target Assembly Facility or the Lockheed Martin Target Missile Systems facility in one of the on site storage magazines for up to one year as the result of aircraft or mission delay, launch delays, or production scheduling. Some FTF ground support equipment and components as well as chemical simulants may be stored at the Courtland Target Assembly Facility and Redstone Arsenal.

2.6 Transportation from Integration Facilities to Launch/Staging Locations

Following completion of assembly, integration, and testing activities at the Courtland Target Assembly Facility, the solid propellant targets would be loaded on the CT for transport to the launch/staging location. Following completion of assembly, integration, and testing activities at the Lockheed Martin Target Missile Systems facility, the unfueled liquid propellant targets would be loaded on the TAFT or on the TEL. Cranes may be required to lift the target onto the transportation trailer. Transportation of both solid and unfueled liquid propellant targets to the various launch/staging locations could occur using a combination of trucks, aircraft, and/or barges.

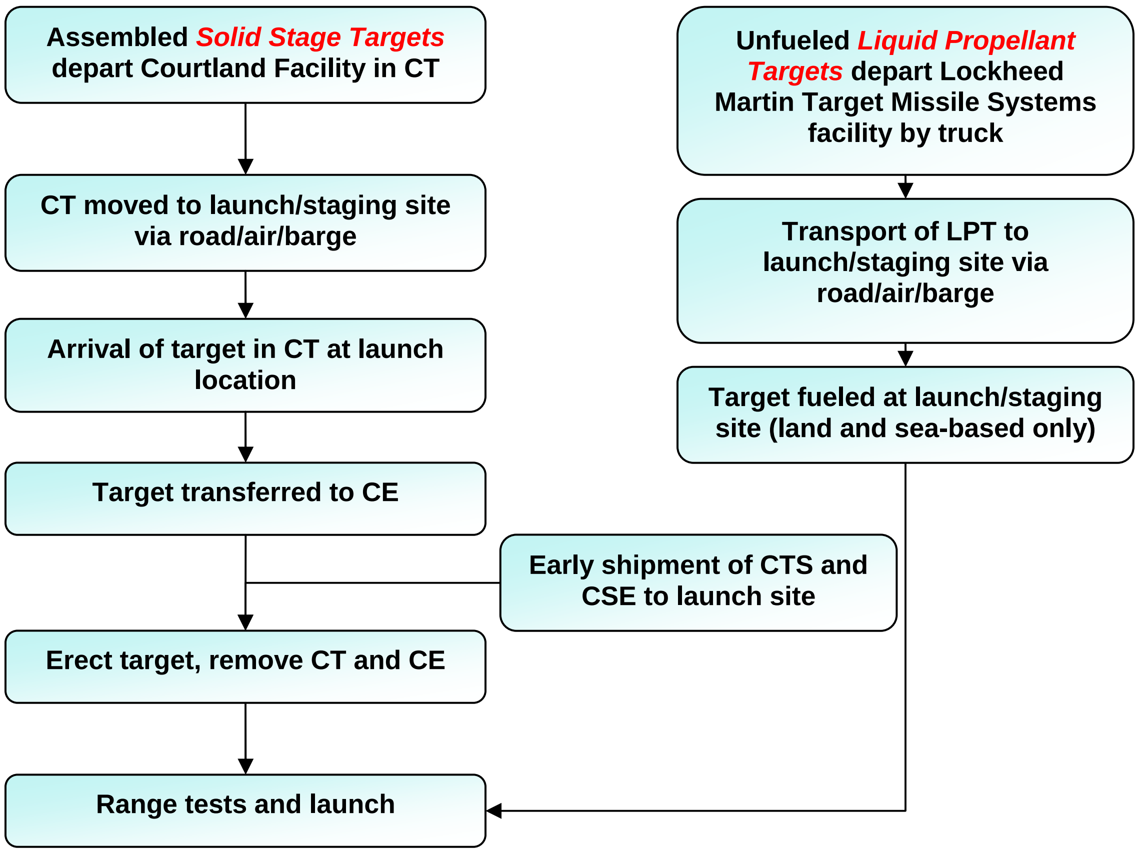
Each target shipment to a launch/staging location would be comprised of a completed target on one or two CTs for solid propellant targets or in an existing containment vessel for an unfueled liquid propellant target, a CE, and all CSE and CTS equipment required for the launch of the target. It was assumed that the CSE and CTS equipment would be loaded on five standard tractor trailers, which would be transported along with the CT and CE, accompanied by security vehicles, from the Single Integration Facility or the Lockheed Martin Target Missile Systems facility to Redstone Arsenal.

In the CT, MDA will limit launch vehicle transport over public highways to transfers between the integration facility and Redstone Arsenal and to transport from the nearest air base or barge port to the launch site when non-public roads are not available and under applicable DOT permits. MDA does not intend to transport vehicles in the CE except at the launch site

Once a solid propellant target has reached the launch site, the CT containing the FTF target would be attached to the CE. During the transfer process, a 46-meter (150-foot) roll transfer area would be required to allow adequate space to complete the transfer. The empty weight of the CE would be approximately 70,300 kilograms (155,000 pounds), and the loaded weight (when carrying an LV-2 target) would be approximately 158,760 kilograms (350,000 pounds). The approximate physical dimensions of the CE would be length 22 meters (71.5 feet), height 4 meters (13 feet), and width 5 meters (17 feet). The CE would be transported to the launch location as part of the ground support equipment.

The liquid propellant target would not be shipped via the CT but would instead be shipped in existing containment vessels typically used for this activity. These targets would be shipped unfueled from the Lockheed Martin Target Missile Systems facility to Redstone Arsenal and then to the launch/staging location. Exhibit 2-3 describes the major flow of FTF solid stage targets from the Courtland facility and liquid propellant targets from the Lockheed Martin Target Missile Systems facility to the launch/staging location.

Exhibit 2-3. Process Flow of FTF Solid Stage and Liquid Propellant Targets



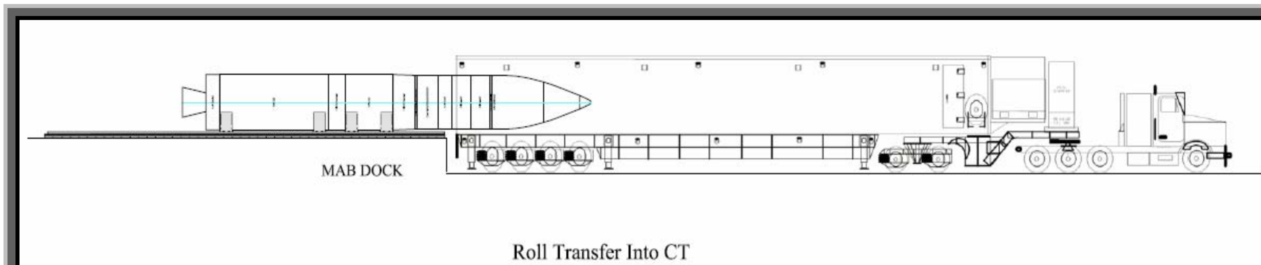
The following subsections provide additional information about the shipping methods proposed to be used for the transport of FTF targets. Note that no shipments via barge are currently envisioned to transport FTF targets to launch/staging locations except for local transport from airport to launch site as required.

2.6.1 Truck Transport

The CT would be developed to support the transport of solid propellant FTF targets from the Courtland Target Assembly Facility to the launch/staging location. The empty weight of the CT would be approximately 41,700 kilograms (92,000 pounds), and the loaded weight (assuming it is carrying an LV-2 target) would be approximately 88,000 kilograms (194,000 pounds). The approximate physical dimensions of the proposed CT would be length 19 meters (62 feet), height 4 meters (12.5 feet), and width 3 meters (11 feet).

While at the Courtland facility, the solid propellant FTF targets would be loaded onto the CT. The LV-3 target would require two CTs, or in the near-term one CT and one C-4 motor air transport container. Exhibit 2-4 shows how the target would be rolled from a loading bay at the Single Integration Facility to the CT. The air bearing roller transfer system would transport the missile assembly to the shipping dock. The CT would provide for height adjustment so that the apex of the transporter rollers and the apex of the air bearing roller transfer system would be aligned on the same plane. A winch would be used to roll transfer the missile assembly pallet onto the CT.

Exhibit 2-4. Roll Transfer of FTF Target



Once secured on the CT, the solid stage FTF target would be shipped by truck from the Courtland Target Assembly Facility. For purposes of this analysis it was assumed that all FTF targets would be shipped on the CTs over the road to Redstone Arsenal Army Airfield where the targets would then be loaded onto aircraft and transported by air to the appropriate launch/staging location. The transport of the target and all support equipment to Redstone Arsenal would require up to five trucks in addition to the CT and CE. Additionally up to five security vehicles would be required to accompany the target vehicle convoy.

Similarly, the unfueled FTF liquid propellant target would be secured on a standard transport container for shipment from the Lockheed Martin Target Missile Systems facility to the launch/staging location. The FTF target would be shipped over the road to Redstone Arsenal Army Airfield where the target would then be loaded onto a C-17 aircraft and transported by air to the appropriate launch /staging location.

2.6.2 Aircraft Transport

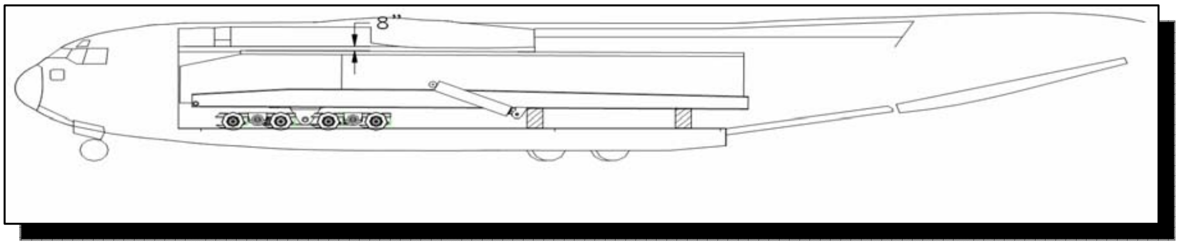
Air transportation of the solid stage FTF targets and supporting equipment would use two military aircraft, the C-5 and C-17.

The C-5 had its maiden voyage in 1968 and was designed to provide strategic heavy airlift over intercontinental distances for the military services. The C-5 is approximately 75 meters (247 feet) long with a wingspan of 68 meters (223 feet). The aircraft is powered by four turbofan TF39 engines. The maximum payload of the C-5 is 122,500 kilograms (270,000 pounds). Cargo is loaded through nose and aft doors that open to the full width and height of the cargo compartment. The cargo hold of the C-5 is 37 meters (121 feet) long, 4.1 meters (13.5 feet) high, and 5.8 meters (19 feet) wide. The maximum range of the aircraft without refueling is approximately 6,033 kilometers (3,257 nautical miles). (National Aeronautic and Space Administration (NASA), 2004)

The C-17 aircraft first flew in 1991 and is designed to provide cargo transport for the military services. The C-17 is approximately 53 meters (174 feet) long with a wingspan of over 52 meters (169 feet). The aircraft is powered by four F117-PW-100 engines, the same engines currently used on the Boeing 757. Cargo is loaded on the C-17 aircraft through an aft door that can accommodate military vehicles and palletized cargo. The maximum capacity of the C-17 is 77,519 kilograms (170,900 pounds). The maximum range of the C-17 without refueling is approximately 4,445 kilometers (2,400 nautical miles). (U.S. Department of the Air Force, 2005)

For solid stage targets the CT carrying the assembled target would be loaded onto a C-17 aircraft at Redstone Arsenal Army Airfield. The target and CT would then be flown to the launch/staging location or to an airport near the launch location. Exhibit 2-5 shows the FTF target on the CT when loaded on the C-17. Five C-17 aircraft and one C-5 aircraft would be required to transport a two-stage FTF target (the majority of the proposed FTF targets are comprised of two stages) and all associated support equipment to the launch/staging location for each launch. The C-5 aircraft is required to transport the CE. Seven C-17 aircraft and one C-5 aircraft would be required to ship a three-stage LV-3 target and its associated equipment to the launch location. The extra C-17s would be required because prior to shipping, the LV-3 first stage and second stage (two C-4 first stages) would be mated and shipped together and the LV-3 third stage would be shipped in a separate C-17 to the launch location.

Exhibit 2-5. FTF Target on Common Transporter when Loaded on C-17



The unfueled FTF liquid propellant target would be loaded on its shipping container into a C-17 aircraft at Redstone Arsenal Army Airfield. The target would then be flown to the launch/staging location or an airport near the launch location.

Exhibit 2-6 provides a summary of transportation methods for FTF targets from all launch platforms. For land launches it may be necessary to truck or in the case of the U.S Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS) to barge the target to the launch site which may be at some distance from the receiving airport. For sea and air launches the receiving airport is the staging location prior to transport by air or sea to the launch location in the broad ocean area (BOA). Exhibit 2-6 also shows the distance between the airport and the launch location.

Exhibit 2-6. FTF Targets Transportation Summary[1]

Launch Location	Receiving Airport	Air Distance from Redstone Arsenal to Receiving Airport[2], kilometers (miles)	Ground Distance from Receiving Airport to Launch Site, kilometers (miles)	Sea Distance to Launch Site, kilometers (miles)
Land Launches				
Fort Wingate	Kirtland AFB	1,802 (1,120)	120 (75)	N/A
Vandenberg AFB	On-site airport	3,074 (1,910)	16 (10) to TP-01; 20.5 (12) LF-05; 22.5 (14) to LF-06A	N/A
WSMR	Holloman	1,834 (1,140)	32 (20)	N/A
Kodiak Launch Complex (KLC)	Kodiak Airport, Kodiak Alaska	5,410 (3,360)	71 (44)	N/A
Pacific Missile Range Facility (PMRF)	On-site airport	7,128 (4,430)	3.2 (2)	N/A
Meck Island, USAKA/RTS	Airport on Kwajalein	10,838 (6,736)	Less than 8 (5)	29 (18) - barge from USAKA/RTS to Meck Island

Launch Location	Receiving Airport	Air Distance from Redstone Arsenal to Receiving Airport[2], kilometers (miles)	Ground Distance from Receiving Airport to Launch Site, kilometers (miles)	Sea Distance to Launch Site, kilometers (miles)
Wake Island	On-site airport	10,216 (6,350)	Less than 5 (3)	N/A
Sea Launches[3]				
BOA	Pearl Harbor, Hickam AFB	7,000 (4,350)	8 (5)	N/A
Air Launches[4]				
BOA	PMRF	7,128 (4,430)	N/A	N/A
BOA	Yuma Proving Ground (YPG), Arizona	2,579 (1,600)	N/A	N/A
BOA	Elmendorf AFB, Alaska	5,260 (3,270)	N/A	N/A
BOA	Hill AFB, Utah	2,320 (1,440)	N/A	N/A
BOA	Misawa Air Base (AB), Japan	10,300 (6,400)	N/A	N/A

1 The ground distance from the Courtland Target Assembly Facility to Redstone Arsenal is the same for all launch and staging locations, 69 kilometers (43 miles).
2 Source: Air Routing International (http://www.airrouting.com/content/tdcalc.html)
3 Source: Web Flyer (http://www.webflyer.com/travel/milemarker/)
4 For sea and air launch targets, the receiving airport also serves as the staging location prior to launch over the BOA.

2.6.3 Summary of Transportation Methods for FTF Targets

Exhibit 2-7 presents the total shipment distance from the assembly, integration, and testing locations to the launch/staging locations and estimates the number of shipments to each location annually. This exhibit details the transportation assumptions that were used in the analysis.

Exhibit 2-7. FTF Target Shipments to Launch Location

Launch Location	All Transport Modes	
	Shipment Distance[1,2]	*Annual Shipments*[3,4,5]
Fort Wingate	1,991 kilometers (1,238 miles)	1
Vandenberg AFB	3,166 kilometers (1,967 miles)	4
WSMR	1,935 kilometers (1,203 miles)	3
KLC	5,550 kilometers (3,447 miles)	2
PMRF[6]	7,200 kilometers (4,475 miles)	7
USAKA/RTS	10,944 kilometers (6,802 miles)	1
Wake Island	10,290 kilometers (6,396 miles)	2
BOA (Pearl Harbor)	7,000 kilometers (4,350 miles)	Assume 1[7]
BOA (YPG)	2,579 kilometers (1,600 miles)	Assume 1
BOA (Elmendorf AFB)	5,260 kilometers (3,270 miles)	Assume 1
BOA (Hill AFB)	2,320 kilometers (1,440 miles)	Assume 1
BOA (Misawa AB)	10,300 kilometers (6,400 miles)	Assume 1

1 Shipment distance is the sum of air, ground, and barge transportation distances for a one-way trip.
2 Road transport trips of 69 kilometers (43 miles) would be required to move the solid propellant targets from the Courtland facility to the Redstone Arsenal Army Airfield for loading on a C-17 or C-5 for transport to the launch location. Because the distance required to ship liquid propellant targets from the Lockheed Martin Target Missile Systems facility would be less than for solid propellant targets this analysis conservatively assumes that all targets would be shipped 69 kilometers (43 miles) over the road.
3 Total of 20 targets could be shipped annually from the Courtland Target Assembly Facility and the Lockheed Martin Target Missiles System facility.
4 There could be up to seven C-17 aircraft and one C-5 aircraft making one roundtrip flight per shipment, resulting in a total of up to seven roundtrip C-17 flights and one roundtrip C-5 flight associated with each shipment.
5 Based on MDA estimates of target launches from various locations on an annual basis.
6 Whether the target is launched from PRMF or stages at PMRF for an air launch, the shipping distance is the same.
7 For purposes of analysis, one target was assumed to be launched involving each of the staging locations as indicated.

2.7 Target Use Activities

FTF launches could involve land, sea, or air-based launch platforms as discussed below. The specific use activities associated with each platform are discussed in subsequent sections.

Target use activities can be grouped as pre-launch, launch, and post-launch activities. *Pre-launch* activities for **land** launches would include site preparation and construction, short term storage of the target, pad setup, final integration and testing of the target, clearing the range area, fueling the target and other range requirements prior to launch, as appropriate. *Pre-launch* activities for **sea** and **air** launches would occur at staging locations and include all of the above activities except site preparation and construction.

Launch activities would consist of the launch and flight of the target, beginning with first stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept (some missions), and debris generation. *Post-launch* activities would consist of debris clean up including minor refurbishment of the launch stand, pad, or rails, potential recovery, and transport of the support equipment to the appropriate storage facility.

2.7.1 Launch Platforms

Launches of FTF targets could take place from any of three launch platforms, land, sea, and air. Several land launch locations have been identified and are analyzed in this EA. In addition, staging areas for the sea and air launch platforms are identified and analyzed in this EA. Regardless of the location, all launches are analyzed assuming a common set of pre-launch, launch, and post-launch activities as described above. Although the specific procedures may vary from range to range, the activities identified in this EA were assumed to be broad enough to encompass these variations.

Land. Land launches of the solid propellant FTF targets would use the CT and CE systems developed for the FTF targets. This system would include an umbilical mast and launch stand that is adaptable to all proposed solid propellant FTF targets. Environmental impacts of launching solid propellant targets have been analyzed in NEPA analyses for all land launch locations and are summarized as appropriate in subsequent sections of this EA.

Land launches of liquid propellant FTF targets would use existing support equipment including a launch control van (if existing permanent launch facilities are not available), pad equipment shelter (pick up truck with electronics shelter on truck bed), missile TAFT, four 100-kilowatt diesel or gasoline generators (only used if power is not otherwise available), and specialized fueling equipment (i.e., pumps, valves, fittings, and hoses to transfer propellants from storage tanks to missiles). This support equipment would operate as described in the MDA's WSMR, New Mexico, LPT EA. That analysis is summarized as appropriate in this EA. (MDA, 2002a)

Sea. Sea launches would occur from the BOA and would be conducted from a free floating platform that would not be anchored to the ocean floor during sea launches. The MLP, the former USS Tripoli would be a typical example. The MLP was refurbished in 2002. As part of this refurbishment, mobile launchers were attached to the flight deck using multiple deck tie-down points. The MLP is approximately 183 meters (602 feet) long, 32 meters (104 feet) wide, with a 9.7 meter (32 foot) draft. The MLP has quarters for up to 100 personnel.

The MLP has no engines for propulsion and would be towed from the homeport to the launch location. Either a government-owned contractor-operated or commercial tug would tow the MLP prior to and following launches. Tug service for docking and undocking would be contracted to a commercial tug service. The tow line connecting the MLP and the tow vessel would be of sufficient length for the tow vessel to be a safe distance from the MLP and the ships would be oriented so that the target flight would be away from the tow vessel.

Sea launches of FTF targets would be conducted from any portion of the world's oceans consistent with data collection requirements, range safety/target control constraints, maritime law, treaties governing activities within international waters, and the territorial limits of other nations. The MLP would have the capability to conduct launch operations at least 2,000 kilometers (1,243 miles) from its staging location and remain on station for a minimum of 10 days. While at sea, the vessel would be self-sufficient so as not to rely upon replenishment or resupply. MLP maximum deployment is 21 days per mission. After 21 days the MLP must return for re-provisioning. In addition, the MLP would be able to support only one mission per deployment. The re-provisioning timeline would preclude being able to support two missions within a 30-day period. However, a back-up (or second) launch could occur during a single deployment and would be mission dependant.

The environmental impacts of the operation of the MLP as a sea launch platform were analyzed in the MLP EA and were found to be less than significant. (MDA, 2004a)

Air. Air launch of solid propellant FTF targets would be from the C-17 cargo aircraft. No air launches of liquid propellant FTF targets would occur. Air launches of FTF targets could be conducted from contractor or government supplied C-17 aircraft.

FTF Targets would be flown from Redstone Arsenal to one of five staging locations: YPG, Hill AFB, Elmendorf AFB, Misawa AB, or PMRF. Activities at all staging locations would be similar and are described below. No site construction or modification is anticipated at any of the staging locations. Following arrival at the appropriate staging location, the solid propellant target would be secured to the pallet and final functional tests would be performed. Additionally, a small amount of hydrazine fuel would be loaded into the liquid-fueled Avionics Control Module (ACM) ACS of the SR19, Castor IVB, SR19/SR19, and LV-2 targets. Following pre-launch staging activities, the C-17 would fly to a predetermined drop point over the BOA.

The pre-launch staging activities represent routine activities at all of the five staging locations. The addition of one FTF Target launch per year originating from each of the five staging locations would not cause a significant increase in existing operations at the staging location. The FTF Targets would be launched over the BOA; therefore, target launch and post-launch activities would not affect the aircraft staging locations, but would impact the BOA. A discussion of launch impacts on the BOA is presented in Section 4.16.

The environmental impacts of the air launch of targets were analyzed in the Long Range Air Launched Targets EA and were determined to be not significant. (MDA, 2002b)

2.7.2 Pre-Launch Activities

2.7.2.1 Land

Pre-launch activities for land launches would include site preparation and construction, short term storage of the target, setup, final integration and testing of the target, fueling the target, clearing the range area and other range safety requirements prior to launch, as appropriate.

Site Preparation and Construction activities would include minor site modification or construction activities such as those described for the specific launch locations in Section 2.7.5.

The remaining pre-launch activities discussed below are normal operations at ranges or launch sites and have already been addressed in numerous NEPA analyses including the BMDS PEIS (MDA, 2007a), the GMD ETR EIS (MDA, 2003a), the THAAD Pacific Test Flights EA (MDA, 2002c), the LPM Site Preparation and Launch EA (MDA, 2002d), and the TMD ETR EIS (SSDC, 1994a).

Short Term Storage of a target would occur as necessary at the destination launch location, if it is not possible to launch the assembled target within a reasonable timeframe. A fully assembled target could be stored on site at any of the launch locations in an appropriate storage facility for up to one year as the result of mission or launch delays.

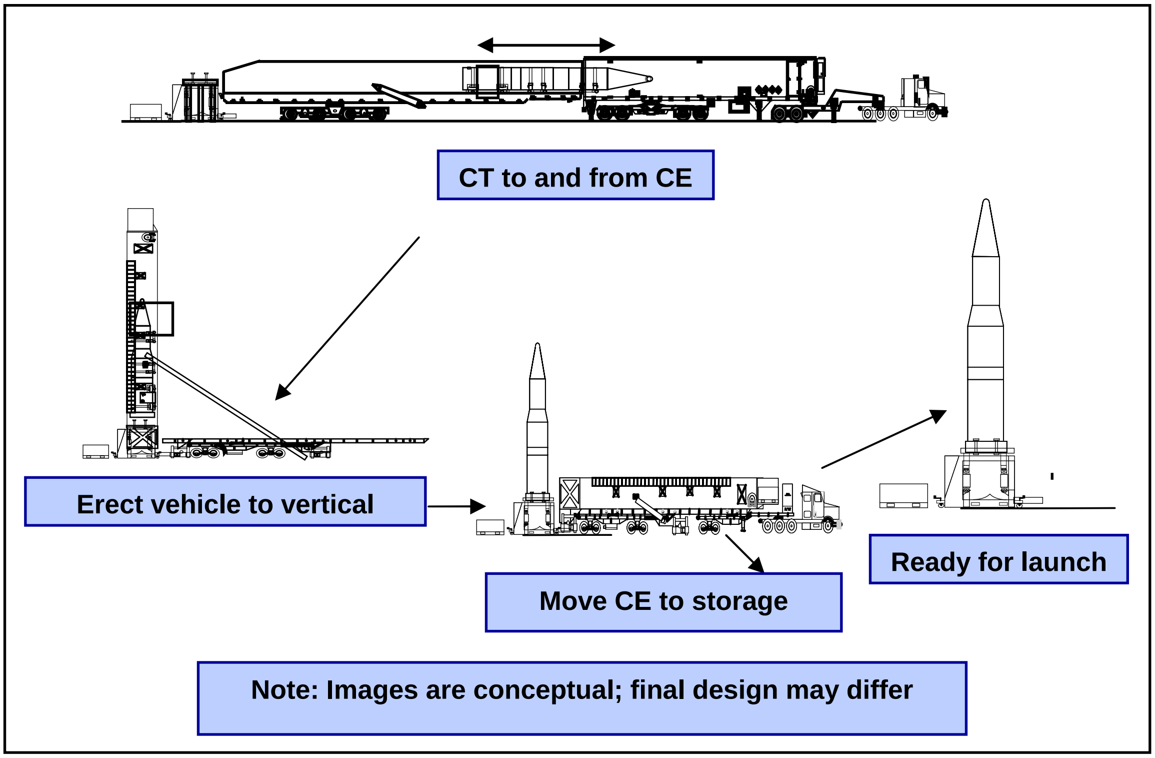
Setup, Integration and Testing, and Fueling Activities at the land launch sites for FTF targets would include assembly of the launch stand and anchoring the launch stand to the pad. For solid propellant FTF target launches, the CE would be positioned at the launch stand and configured for launch operations. Other functional testing of the CE and launch stand and umbilical mast would be performed as part of these activities. The CT and CE would be aligned and the roll transfer of the FTF target from the CT would begin, moving the target to the CE. The CE would be supported by four metal tie downs on the launch pad.

Once the solid propellant vehicle is on the CE, it would be prepared for post transportation confidence tests and system level testing. In addition, a small amount of hydrazine would be loaded into the liquid-fueled ACM ACS of the SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 solid propellant FTF targets using a specialized propellant loading system.

Following all necessary tests, the CE would be used to erect the FTF target on the launch pad and the umbilical mast would be secured to the target pad by three tie downs. The thermal cover would be tied down with four guy wires. Targets with unshrouded front sections would be covered with a tarp that would remain in place until the target is launched from the platform. Exhibit 2-8 shows the pre-launch set up activities for a solid propellant FTF target.

Pre-launch set-up activities for solid propellant targets have been previously analyzed in multiple NEPA analyses including the BMDS PEIS (MDA, 2007a), the GMD ETR EIS (MDA, 2003a), and the TMD ETR EIS (SSDC, 1994a).

Exhibit 2-8. Pre-launch Setup of Solid Propellant FTF Target



Pre-launch activities for liquid propellant FTF targets would include fueling the target. Fueling activities at launch sites would use portable equipment and spill containment. The liquid propellant FTF targets would be loaded with propellant 8 to 10 days before launch. Once the propellants are loaded, there is a "use or lose" time limit in which the launch needs to occur. This time limit is a function of the propellant properties and how long these propellants can be stored in the target prior to use. The initiator propellant would be transferred to the target approximately 15 minutes before launch. The propellants would be loaded on the target while the target is still in a horizontal position. Existing spill response plans and liquid propellant transport and handling plans would include appropriate safety measures for the procedure. All planned fueling procedures would be approved by the appropriate range environment and safety directorate or directorate of public works before beginning activities. Fueling operations would be as described and analyzed in the LPM Site Preparation and Launch EA. (MDA, 2002d)

Range Clearing and Other Requirements include developing impact zones for each target launch based on detailed launch planning and trajectory modeling. This modeling would include analysis and identification of a flight corridor. Launches would be conducted when trajectory modeling verifies that the target and debris would be contained within predetermined areas.

The establishment of a Launch Hazard Area (LHA) is required for each test event to provide protection for mission-essential personnel. The LHA provides a designated area from which personnel are cleared based on potential hazards from any target debris that may result from launch or near-launch failure. A mission-specific LHA would be established based upon the actual flight profile, launch location, and system performance. Before launch, Notices to Airmen (NOTAMs) and Notices to Mariners (NOTMARs) might be required. These notices would identify areas to remain clear and the times that avoidance of the area is advised. Area clearance requirements and final launch decision is up to the appropriate range safety personnel. Clearance and closures of the airspace and warning areas are considered normal operations and would be determined using mission specific pre-launch and flight corridor calculations. Radar and visual sweeps of the hazard area would be conducted immediately prior to launch to ensure they are clear of non-critical personnel.

Prior to launch, LHAs as defined by range safety personnel are cleared and the launch command would be given from the launch control area. After the LHA and launch corridors for the target are verified clear, the launch command would be given. Standard protective procedures would be followed during test activities to provide hearing protection for workers and minimize any noise impacts associated with launch activities. Missile impact areas would be clearly defined. The standard operating and safety procedures mentioned above would be tailored for specific missions as necessary.

Test mishaps for targets are defined in terms of three scenarios: termination/detonation on the launcher, termination of a flight shortly after liftoff, and termination of a flight after it has exited the vicinity of the launch site.

A test mishap or termination of a flight on the launcher/launch pad would be characterized by an explosion and/or detonation of the missile propellants and explosives, or a scenario in which the missile propellants and explosives burn without detonation or explosion. An ESQD surrounding the launcher/launch pad would be calculated based on the equivalent explosive force of the total quantity of propellant and pyrotechnic materials contained in the flight vehicle including the payload.

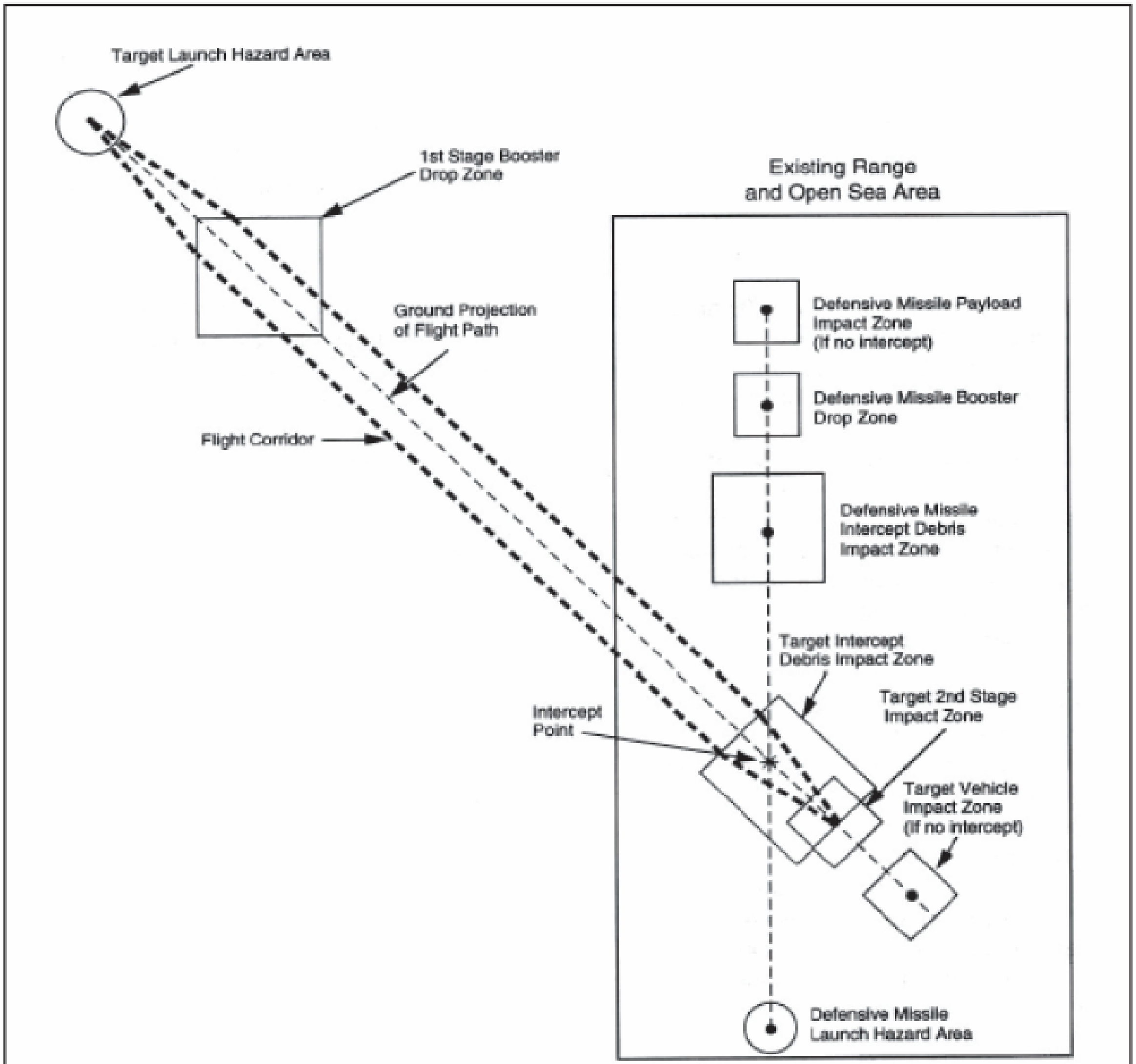
Termination of a flight shortly after liftoff would result in all hazardous debris being contained within the LHA. During launch activities, mission essential personnel within the LHA would be protected from debris and other hazards that would result from a test mishap or termination on the launcher/launch pad. These protective measures are analyzed in the Health and Safety discussion in Section 4 of this EA.

Termination of a flight after it has exited the vicinity of the launcher/launch pad would occur in the event of an off-course flight. The Flight Termination System (FTS) would be activated, terminating the missile's thrust, and the vehicle would fall in a ballistic trajectory into the sea or designated land area. Before each flight, a flight corridor and debris footprint potential would be established such that the probability of human casualties or property damage would be extremely remote in the event of a command destruct event or missile anomaly. The debris footprint takes into account all planned missile body impact points and potential intercept debris patterns. Mission planning and procedures would be developed to activate the FTS in time to ensure that the missile would fall within a defined area in the event of an off-course flight. For some missions involving the use of FTF targets it may be necessary to conduct recovery efforts after the vehicle falls into the designated range area.

Exhibit 2-9 depicts the LHAs, booster drop zones, intercept debris impact zones, and intact target and interceptor debris areas.[2] Impact zones are areas in which hardware impacts would occur. The location and dimensions of the impact zones may vary for each flight test scenario. Impact areas for expended boosters, targets, defensive missile debris resulting from a successful intercept, and intact defensive missile payloads (in the event of a failed intercept) would be determined for each test event based on detailed launch planning and trajectory modeling. The planning and modeling would include analyses and identification of a flight corridor based on a flight failure at any point in the flight trajectory.

[2] Note that intercept debris impact zones and interceptor debris areas are not considered in this EA because it only considers the launch of the target not its involvement in potential test scenarios.

Exhibit 2-9. Representative Impact Zones



Source: Modified from U.S. Army Space and Strategic Defense Command, 1994

2.7.2.2 Sea

Pre-launch activities for sea launches would include preparation of the MLP launch stand for arrival of the target, setting the target on the launch stand, and transporting the MLP to the test event location.

As part of pre-launch activities MDA would assemble the launch stand and anchor the launch stand to the pad on the MLP. For solid propellant FTF target launches the CE would be positioned at the launch stand and configured for launch operations. Functional testing of the CE and launch stand and umbilical mast would be performed as part of these activities. Other pre-launch preparation activities would include adding the aft skirt to the missile and elevating the target to the appropriate launch angle.

The MLP has been removed permanently from its original home port at Mare Island and is being berthed at Pearl Harbor for the foreseeable future. Pearl Harbor is authorized and equipped to handle ordnance and most of the pre-launch activities would take place there, including the installation of the target missile. However, in some instances the target may be erected enroute to the launch destination. Activities associated with transportation of the MLP to the launch location would be the same as for other marine vessel activity in the area.

Loading liquid propellant targets would take place on the MLP in route to the launch location. Additionally, a small amount of hydrazine would be added to the liquid-fueled ACM ACS of SR19, Castor IVB, and SR19/SR19 solid propellant targets. Spill control for the propellant transfer operations would be provided by a well-equipped and well-trained spill response team on stand-by onboard the MLP. Oxidizers spills would be immediately washed overboard to protect those onboard from toxic vapors. Fuel spills would be contained, absorbed, collected or washed overboard as the situation dictates.

Propellant storage locations would be continuously monitored for leaks by an electronic vapor detection system. After completion of the transfer operations, the transfer equipment would be flushed to decontaminate it. Should it become necessary to remove the propellant from the booster, the propellant would be transferred into empty bulk liquid propellant containers. The propellant containers would then be transported back to the respective propellant storage areas for reuse in the next mission. The defueled oxidizer tank would be flushed with deionized water and the fuel tank would be flushed with ethyl alcohol. The material generated from flushing the fuel and oxidizer systems would be handled as hazardous waste and would be disposed according to appropriate procedures at Pearl Harbor. The booster would be transported back to the missile assembly building for reuse or returned to an appropriate storage facility.

As part of pre-launch activities MDA would be responsible for coordinating airspace use. NOTAMs and NOTMARs may be required to notify people in the affected area that missile launch activities are scheduled from the MLP. Area clearance requirements and final launch decision is up to the appropriate range safety personnel. Clearance and closures of the airspace and warning areas are considered normal operations and would be determined using mission specific pre-launch and flight corridor calculations. Radar and visual sweeps of the hazard area would be conducted immediately prior to launch to ensure they are clear of non-critical personnel.

2.7.2.3 Air

Pre-launch activities for air launches would include securing the solid propellant FTF target to the pallet and performing final functional tests at one of the air launch locations. In addition, a small amount of hydrazine would be loaded into the liquid-fueled ACM ACS of SR19, Castor IVB, SR19/SR19, and LV-2 solid propellant FTF targets using a specialized propellant loading system.

As part of pre-launch activities MDA would be responsible for coordinating airspace use. NOTMARs and NOTAMs may be required to notify people in the affected area that missile launch activities are scheduled in the BOA. Area clearance requirements and final launch decision are the responsibility of the appropriate range safety personnel. Clearance and closures of the airspace and warning areas are considered normal operations and would be determined using mission specific pre-launch and flight corridor calculations. Radar and visual sweeps of the hazard area would be conducted immediately prior to launch to ensure they are clear of non-critical personnel.

2.7.3 Launch Activities

2.7.3.1 Land

Launch activities would consist of the launch and flight of the target, beginning with first stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept (some missions), and debris generation.

During successful target launches that include a successful intercept, there would be debris comprised of both the target and the interceptor missile. The resulting debris would follow a ballistic trajectory; all intercepts would occur over the BOA or designated land areas and debris would impact in the ocean or specific land areas. Because an exact point of termination cannot be determined, the impact footprint is determined by considering the limits of debris fallout based on destruction of a test missile at the boundaries of the acceptable flight corridor, along with additional flight time outside the acceptable flight corridor based on the time required to initiate the FTS.

During launch there is a potential for target missile malfunction, resulting in explosion, fire, and debris impact in the launch site vicinity. Successful launches involve only small potential hazards, mainly for personnel in the immediate area; these personnel would be removed from the immediate area during launch activities. It also is possible for the target to have an anomaly or be terminated while ready to launch or shortly after launch. Additional precautions would be taken to minimize risk from these scenarios.

2.7.3.2 Sea

Launch activities would consist of the launch and flight of the target, beginning with first stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept (some missions), and debris generation.

Impact zones for each launch would be delineated based on detailed launch planning and trajectory modeling. This modeling would include analysis and identification of a flight corridor. Launches would be conducted when trajectory modeling verifies that the target and any debris would be contained within predetermined areas, all of which would be located over the ocean and removed from land and populated areas. To launch targets from the MLP it may be necessary to establish a 3.7-kilometer (2-nautical mile) radius area as a temporary warning area, extending from the surface to 18,290 meters (60,000 feet) above mean sea level over the MLP.

As a result of target test launches, there could be target vehicle or stage debris from a flight termination, which follows a ballistic trajectory and would impact in the ocean. Because an exact point of termination cannot be determined, the impact footprint is determined by considering the limits of debris fallout based on destruction of a test missile at the boundaries of the acceptable flight corridor, along with additional flight time outside the acceptable flight corridor based on the time required to initiate the FTS.

2.7.3.3 Air

Following takeoff from the airport, the C-17 would fly to a predetermined drop point over the BOA. At the designated altitude, the aircraft aft door would be opened and the palletized FTF solid propellant target vehicle would be extracted from the aircraft. Following missile extraction, when the aircraft is clear and system checks are complete, a missile flight control officer would send an enable signal that arms the missile system while it descends on the parachutes. The pallet, however, remains attached to the parachutes for the rest of its descent. Should some malfunction occur following its extraction from the aircraft and descent by parachute, the command would not be sent and the palletized missile would descend by parachute to the ocean.

After descending by parachute to an altitude of approximately 6,096 meters (20,000 feet) above mean sea level, explosive cutters would sever the straps holding the missile to the pallet, allowing the target to fall away. The pallet and parachutes would remain connected and continue their slowed descent to the ocean. The pallet and parachute would sink into the ocean. The metal hardware attached to the parachutes would aid their sinking to the ocean bottom. MDA has no plans to recover this hardware.

Following its separation from the pallet, the first stage rocket motor would ignite, at which time powered flight begins. On the missile’s flight trajectory, the rocket motors would burn out and separate from the target and fall into the ocean. MDA has no plans to recover this hardware.

Prior to conducting the flight test, MDA would conduct a comprehensive safety analysis to determine specific missile launch and flight hazards. Impact zones for each launch would be delineated based on detailed launch planning and trajectory modeling. This modeling would include analysis and identification of a flight corridor. Launches would be conducted when trajectory modeling verifies that the target and debris would be contained within predetermined areas, all of which would be located over the ocean and removed from land and populated areas. A flight termination boundary along the flight path also would be predetermined, should missile malfunction or flight termination occur. The flight termination boundary defines the limits at which command flight termination would be initiated to contain the target vehicle and its debris within predetermined hazard and warning areas, thus, minimizing the risk to test support personnel and the general public. As a result of a successful launch the target vehicle and any stages would impact in the BOA and not be recovered.

2.7.4 Post-Launch Activities

2.7.4.1 Land

Post-launch activities would include clearing debris from the launch area or possible recovery of target components. MDA has no plans or requirements to recover FTF targets or payloads. If a recovery is required due to a mission failure investigation it would be performed on an emergency basis. At WSMR and Fort Wingate there would be debris recovery efforts that would involve equipment already in place and in use at the range.

2.7.4.2 Sea

Post-launch activities would involve a visual inspection of the deck area and collection of any debris on the deck. The fuel burned during the buildup of thrust and lift-off could scorch coatings and insulation materials on the MLP and leave carbon residues on the deck. Debris including any wastewater generated from cleaning the deck would be disposed of in accordance with applicable regulations including the International Convention for the Prevention of Pollution or brought back to port for disposal. MDA has no plans or requirements to recover FTF targets or payloads. If a recovery is required due to a mission failure investigation, it would be performed on an emergency basis. If an in-flight malfunction occurs, the Range Safety Officer may initiate flight termination, resulting in debris being deposited along the pre-determined flight path.

The MLP would be transported from the test event location to its berthing location as appropriate.

2.7.4.3 Air

Post-launch activities would involve the return of the C-17 to the air launch location. Any FTF equipment would be removed from the aircraft. MDA has no plans or requirements to recover FTF targets or payloads from the BOA. If a recovery is required due to a mission failure investigation, it would be performed on an emergency basis. If a malfunction occurs during the target vehicle's flight, the Range Safety Officer may initiate flight termination, resulting in target vehicle debris being deposited along the pre-determined flight path.

2.7.5 Launch Locations

2.7.5.1 Land

Land launch locations would include:

- KLC, Kodiak, Alaska;
- Vandenberg AFB, California;
- PMRF, Hawaii;
- USAKA/RTS, Meck Island;
- Wake Island;
- WSMR, New Mexico; and
- Fort Wingate Army Depot, New Mexico.

Although MDA proposes to use seven locations for land launches, only four of those seven sites would require additional site preparation and construction activities to prepare to host the FTF launches. These locations include KLC, Kodiak, Alaska; Vandenberg AFB, California; USAKA/RTS; and Wake Island. The other three sites would be able to host the FTF land launches without any additional site preparation and construction. This EA analyzes the potential environmental impacts of possible site preparation and construction activities at those four locations. Any other site preparation and construction activities are outside the scope of this EA and would need to be considered in separate environmental documentation as appropriate.

Site Specific Site Preparation and Construction Activities

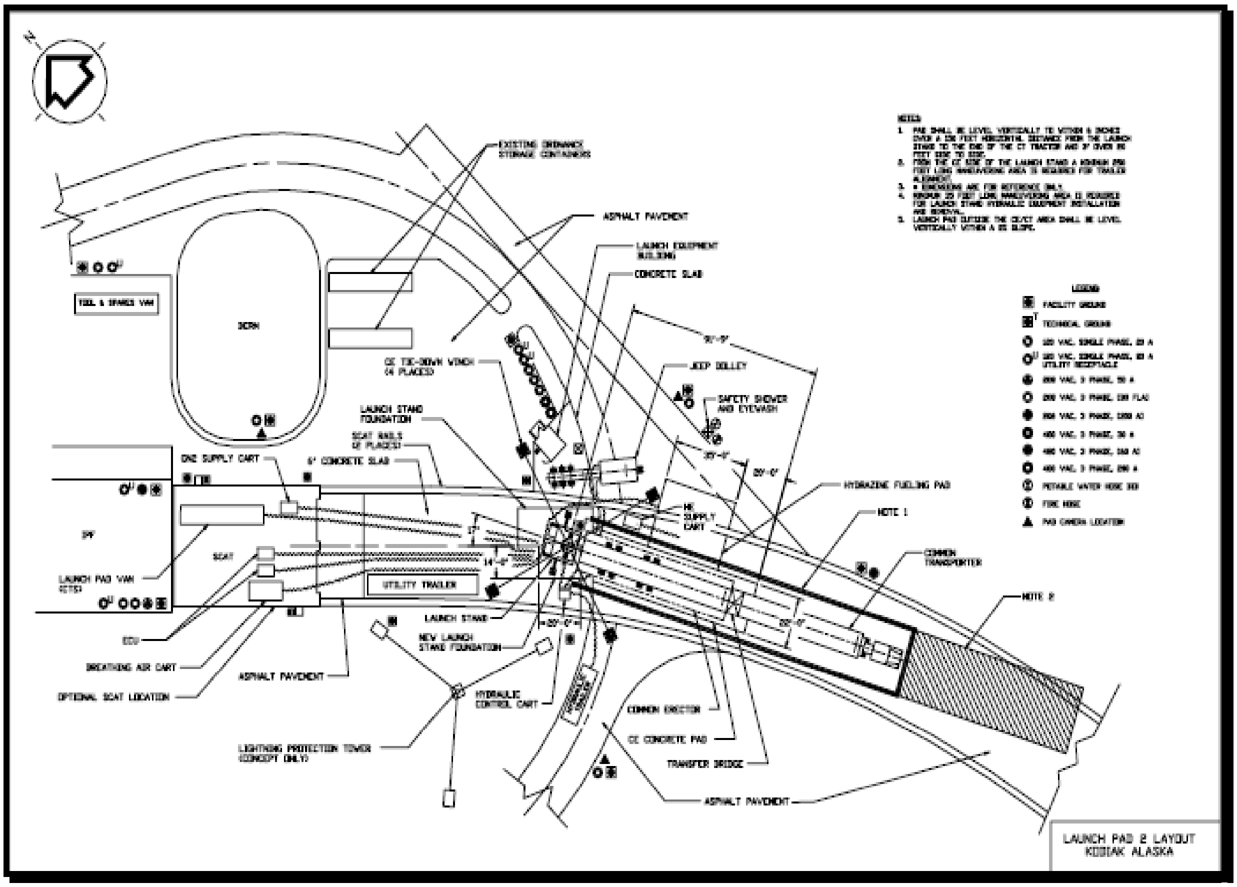
Kodiak Launch Complex. For purposes of this analysis it was assumed that site preparation and construction activities at KLC would include:

- Installation of a lightning protection system.
- Pouring new concrete to expand the existing reinforced launch pad to support the FTF launch stand. The new concrete would expand the launch pad to 4.3 meters by 6.1 meters (14 feet by 20 feet) in area and would be built on previously disturbed land.

- Pouring new concrete to expand the existing launch pad paved area to accommodate propellant loading equipment. The new concrete would expand the launch pad propellant staging area to 9.1 meters by 9.1 meters (30 feet by 30 feet).
- Installation of metal tie downs on the launch pad to support the CE.

A layout of the launch pad at the KLC is shown in Exhibit 2-10.

Exhibit 2-10. Layout of KLC Pad



Vandenberg AFB. Up to four estimated launch missions would occur annually at Vandenberg AFB from the TP-01 (Building 1840), LF-05, and/or LF-06a launch pads. The TP-01 launch site at Vandenberg AFB would be used to launch FTF targets and Building 1894 (Test Igloo) would be used for temporary storage of the LV-2/LV-3 and CT/CE. The LF-05 launch site at Vandenberg AFB has been identified as a suitable location for a 50K rail and a stool capable of supporting Castor IV size vehicles (see Exhibit 2-11).

Exhibit 2-11. Vandenberg AFB LF-05 Launch Pad

The LF-06a site would be used for LPT launches.[3] For purposes of this analysis it was assumed that site preparation and construction activities at Vandenberg AFB would occur at the TP-01 launch pad under the proposed action and would include

- Creating a 5.6-kilometer (3.5-mile) long, 0.3-meter (1-foot) deep, 23-centimeter (9-inch) wide, trench to lay fiber optic cable from the launch site, TP-01 to the Technical Support Center;
- Installing a new gate in the existing fence around the launch pad to allow the communications trailer to park behind the existing concrete wall;
- Installing metal tie downs in the existing metal pad under the launch stool to support the CE;
- Installing a lightning protection system;
- Pouring 200 square meters (2,150 square feet) of concrete to allow for CT access through Building 1894's main gate; and
- Pouring 2,000 square meters (21,528 square feet) of concrete to expand parking lot at the Technical Support Center Site[4].

U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site. Site preparation and construction activities at USAKA/RTS would take place on Meck Island

[3] The LF-05 and LF-06a sites at Vandenberg AFB are being developed outside the FTF Program.
[4] Urban Design Standard Manual, 2005, http://www.iowasudas.org/documents/Ch12Sect1-05.pdf
Each car was estimated to require 33 square meters (350 square feet) of concrete. The parking lot is being expanded to hold 50 to 75 cars. This would require 1,625 to 2,438 square meters (17,500 to 26,250 square feet) of concrete.

(see Exhibit 2-12). One estimated target launch mission is projected to occur annually at Meck Island. The northern Missile Assembly Building (Building 5098) would be used for final launch site integration or final testing prior to launch. The launch pad on the northern end of Launch Hill would be used to launch FTF targets. The pad van would be located at Building 5064 under Launch Hill. The launch van would be located in Building 5050. The transfer trailer would be located on the launch pad along with the CE (for solid propellant targets).

Exhibit 2-12. Launch Site on Meck Island

Modifications to the existing infrastructure on Meck Island needed to support the proposed action would include:

- Excavating a cut in the side of Launch Hill and constructing concrete stairs up the hill. Ground to be disturbed would be 15 meters by 5 meters (50 feet by 15 feet) in area.
- Drilling holes in the existing concrete of the flame duct to install a cable tray and tie down points and installing a new insulating plate and door on the top of the flame duct where it meets the surface of the launch pad.
- Removing old concrete and pouring fresh concrete with embedded metal tie downs at the launch pad for the CE, thermal rocket cover and umbilical mast. Paved area to be disturbed would be 9 meters by 5 meters (28 feet by 15 feet) and 30 centimeters (12 inches) deep.
- Four lightning protection towers exist at the southern end of launch hill. Two of these towers would need to be extended or replaced to reach 23 meters (75 feet).

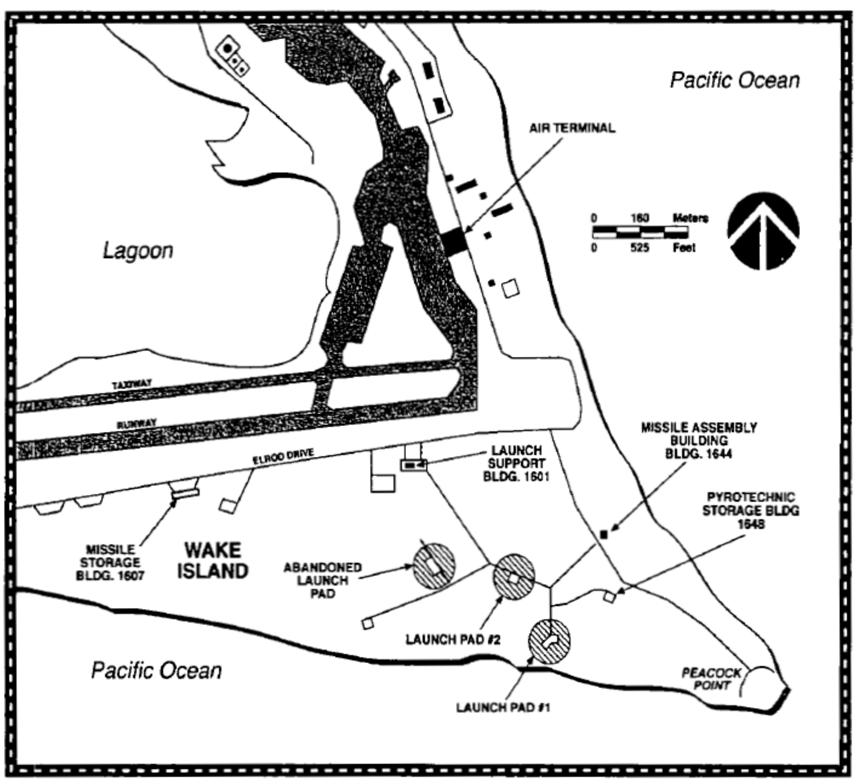
The asphalt foundations of the towers would be demolished and new reinforced concrete foundations would be constructed.

- Pouring a new concrete decontamination pad adjacent to Building 5084. The new pad would be 56 square meters (600 square feet) in area and would be built on previously disturbed land.
- Removing the old asphalt approach to Building 5050 and pouring a new concrete approach. Paved area to be disturbed would be 135 square meters (1,450 square feet).

A mobile lightning protection system may be designed instead that could be transported to each of the launch sites. The mobile system would likely consist of two trailers containing portable towers with grounding rods that could be locked into an existing ground plate.

Wake Island. Launches from Wake Island would occur from launch pad #2 (see Exhibit 2-13). Two estimated target missions could occur from Wake annually. In Exhibit 2-13 launch pad #2 is located between the abandoned launch pad and launch pad #1. This location is 64 meters (210 feet) long and could accommodate the 46-meter (150-foot) length of the CT and CE during roll transfer.

Exhibit 2-13. Wake Island Missile Launch Complex



For purposes of this analysis it was assumed that site preparation and construction activities at the Wake Island site would include the following.

- Modifications would be required to Pad 2 including moving the launch pad from the center to the back end of the concrete apron.
- The power and backup generators, lightning protection system (34 meters [110 feet] high) and tie down locations are all adequate but would need to be moved to the far end of the apron.

2.7.5.2 Sea

Sea launch locations would include launches that would occur in the Pacific BOA. One estimated sea launch mission is projected to occur annually to support MDA's targets test missions. The MLP would be based at its berthing location at Pearl Harbor, Hawaii where all pre-launch staging activities and uploading of missiles would occur. Some missile activities would also occur in port, such as vertical and horizontal hardware checks, telemetry checks, and command destruct receiver tests with the Range Safety platform. Similar operations routinely occur at the Pearl Harbor facilities.

2.7.5.3 Air

Air launch locations for the C-17 aircraft used to conduct air launches would include both staging locations within the continental U.S. and forward staging locations. Staging locations within the continental U.S. would consist of the U.S. Army YPG, Yuma, Arizona and Hill AFB, Utah. Forward staging locations would include the U.S. Air Force Elmendorf AFB, Alaska, PMRF, Hawaii, and U.S. Air Force Misawa AB, Japan. Most air launch missions would take place in the Pacific BOA, but some missions could take place in the Atlantic BOA. Two air launch targets from various locations are projected to occur annually.

Exhibit 2-14 provides a summary of the platforms and locations proposed to be used to launch each type of target being considered under the FTF.

Exhibit 2-14. Summary of Launch Locations and FTF Targets

Launch/Staging Locations	LPT	SR19	SR19/ M57	SR19/ SR19	LV-2	Castor IVB	SR19/ SR73	LV-3
Land[1]								
Fort Wingate	Y	Y	Y	Y	N	Y	Y	N
Vandenberg AFB	Y	Y	Y	Y	Y	Y	Y	Y
WSMR	Y	Y	N	N	N	N	N	N
KLC	N	Y	Y	Y	Y	Y	Y	Y
PMRF	Y	Y	Y	Y	N	Y	Y	N
USAKA/RTS	N	Y	Y	Y	Y	Y	Y	Y
Wake Island	Y	Y	Y	Y	Y	Y	Y	N
Air[2]								
PMRF	N	Y	Y	Y	Y	Y	Y	N
YPG	N	Y	Y	Y	Y	Y	Y	N
Hill AFB	N	Y	Y	Y	Y	Y	Y	N
Elmendorf AFB	N	Y	Y	Y	Y	Y	Y	N
Misawa AFB	N	Y	Y	Y	Y	Y	Y	N
Sea[3]								
Pearl Harbor	Y	Y	Y	Y	N	Y	Y	N

[1] Y = Yes and N = No
[2] Air launches would be staged from these locations, but all launches were assumed to occur in the Pacific BOA.
[3] The MLP would be berthed at Pearl Harbor during FTF testing and Pearl Harbor also would serve as the staging area for the MLP; however, all launches were assumed to occur in the Pacific BOA.

2.8 Alternatives to the Proposed Action

Alternative 1 also would consist of the development; preparation; assembly, integration, and testing; transportation; and use of FTF targets to support BMDS testing. However, the proposed new target configurations, the LV-2 and SR19/SR73, would only be launched from land locations and land and sea locations, respectively; air-based launches of the LV-2 and SR19/SR73 would not occur under Alternative 1. Under this alternative, MDA would continue to produce targets to test the BMDS but would be restricted in the development of some testing scenarios.

2.9 No Action Alternative

The no action alternative would consist of launching only those targets that have had previous NEPA analyses for their launches from land-, air-, and sea-based launch locations; no new FTF target configurations would be launched to support BMDS testing. The three proposed new target configurations, the SR19/SR73, LV-2, and LV-3 that have not previously been considered under NEPA would not be launched from any of the locations considered in the EA. These configurations would still be assembled and integrated at the Courtland Target Assembly Facility in Courtland, Alabama. Under the No action alternative, MDA would continue to launch those targets that had already been addressed from locations already analyzed in previous NEPA analyses. This does not meet the purpose and need for the proposed action as this would severely limit MDA's ability to provide increasingly realistic scenarios as needed to adequately test the BMDS.

2.10 Alternatives Considered But Not Carried Forward

Initially, MDA considered excluding the use of liquid propellant targets from the FTF. Without the use of this target, all FTF targets could be assembled at the Courtland Target Assembly Facility, which is not designed to handle liquid propellants. However, exclusion of these targets would limit MDA's ability to design realistic test scenarios for the BMDS and thus would not meet the purpose of the FTF.

MDA also considered launching the LV-2 and LV-3 from additional locations such as PMRF. However, it was determined that the launch of larger vehicles from PMRF would be outside the range capabilities of the site and major modifications to the site could be required to support these types of launches. Thus, these launch options were not considered in this EA.

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3 AFFECTED ENVIRONMENT

This section presents an overview of the affected environment at Redstone Arsenal, at each of the 12 launch locations identified in the proposed action, the Atlantic and Pacific BOAs, and the atmosphere. The affected environment is described succinctly to provide a context for understanding potential impacts. The level of detail provided for each resource area is commensurate with the potential for impact to that resource area. Therefore, for each of the staging locations (i.e., Elmendorf AFB, Hill AFB, YPG, and Misawa AB) only air quality, hazardous materials and waste management, and health and safety resource areas are provided.

For each location, the area with the potential to be affected by the proposed action is called the Region of Influence (ROI). For the purposes of this analysis, the ROI for land launches was assumed to include the launch pad area and extending downrange from it throughout the flight path. For air launches, the ROI includes the staging location from which the C-17 would fly to the launch location, the location from which the C-17 would release the target and the areas covered by the aircraft and missile flights. For sea launches, the ROI would include the berth location for the MLP, the launch location in the BOA, and the area covered by the target flight after launch. More specific definitions of the ROIs for each resource area are presented in the sections below.

The following subsections provide definitions of each resource area including the relevant laws and regulations that pertain to the resource area and in some cases the existing conditions as well. For each location, a general overview of the proposed operational area is presented. Following that is a discussion of the resource areas that may be impacted by the proposed action. To cut down on bulk, the CEQ NEPA implementing regulations state that agencies shall incorporate material by reference and that the incorporated material must be cited in the document and its content briefly described. For each launch location, relevant environmental documentation has been incorporated by reference and summarized as needed for the analysis. Where existing documents were not available or were incomplete, a concise description is provided.

Thirteen resource areas were considered to provide a context for understanding the potential effects of the proposed action and to provide a basis for assessing the severity of possible impacts, with attention focused on key issues. The resource areas considered include: air quality, airspace, biological resources, cultural resources, geology and soils, hazardous materials and waste, health and safety, land use, noise, socioeconomics and environmental justice, transportation and infrastructure, visual resources, and water resources.

3.1 Resource Area Regions of Influence and Descriptions

3.1.1 Air Quality

Region of Influence. The ROI for air quality assessment depends on the pollutant types, source emission rates and release parameters, the proximity of proposed emission sources to existing emission sources, and local and regional meteorological conditions. For pollutants other than ozone and its precursors, the ROI would generally be limited to an area extending no more than a few kilometers downwind from the source. The ROI for ozone may extend much further downwind than the ROI for inert pollutants; however, impacts from tropospheric ozone and its precursors would only be of concern in project areas that have heavy industry and/or a large amount of automobile traffic. The ROI for the air quality analysis for proposed FTF activities would be the existing airshed at each location.

Description. Air quality is measured in terms of the concentration of various air pollutants in the atmosphere. The type and amount of pollutants emitted into the air, the size and topography of the air basin, and the meteorological conditions related to the prevailing climate determine pollutant concentrations. The pollutant concentrations are measured against Federal, state and local ambient air quality standards (AAQS) that protect public health and welfare. Existing ambient pollutant concentrations are determined by analyzing air monitoring data obtained from monitoring stations located in representative areas and maintained by appropriate state or local agencies.

The Environmental Protection Agency (EPA), in accordance with the Clean Air Act (CAA) of 1970 (42 U.S.C. 7401 et seq.), has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Criteria pollutants include sulfur oxides (SO_X), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (including volatile organic compounds [VOCs] and nitrogen oxides [NO_X] as precursors), particulate matter with a diameter of less than 10 microns (PM_{10}), particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$), and lead (Pb). There are primary and secondary NAAQS for these pollutants. The primary standards were established to protect public health with an adequate margin of safety; the secondary standards were intended to protect the public from any known or anticipated adverse effects of a pollutant. Exhibit 3-1 summarizes the primary and secondary NAAQS.

Exhibit 3-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards	
		Primary[a]	Secondary[a]
Carbon monoxide (CO)	8 hour[1]	10 milligrams per cubic meter (mg*/m^3) (9 parts per million [ppm][b])	---
	1 hour[1]	40 mg/m^3 (35 ppm)	---
Lead (Pb)	Quarterly average	1.5 micrograms per cubic meter (µg**/m^3)	Same as primary
Nitrogen dioxide (NO_2)	Annual arithmetic mean	100 µg/m^3 (0.053 ppm)	Same as primary
Particulate matter as PM_{10}	Annual arithmetic mean[2]	50 µg/m^3	Same as primary
	24 hour[1]	150 µ/m^3	Same as primary
Particulate matter as $PM_{2.5}$	Annual arithmetic[3]	15 µg/m^3	Same as primary
	24 hour[4]	65 µg/m^3	Same as primary
Ozone (O_3)	8 hour[5]	157 µg/m^3 (0.08 ppm)	Same as primary
	1 hour[6]	235 µg/m^3 (0.12 ppm)	Same as primary
Sulfur Oxides (SO_X)	Annual arithmetic mean	80 µg/m^3 (0.03 ppm)	---
	24 hour[1]	365µg/m^3 (0.14 ppm)	---
	3 hour[1]	---	1,300 µg/m^3 (0.5 ppm)

Source: USEPA, 2006a

*mg = 10^{-3} grams; **µg = 10^{-6} grams

[a] Concentration is expressed first in units in which it was adopted and is based on a reference temperature of 25°Celsius (°C) (77°F) and a reference pressure of 760 millimeters (1,013.2 millibars) of mercury. All measurements of air quality must be corrected to a reference temperature of 25°C (77°F) and a reference pressure of 760 millimeters (1,013.2 millibars) of mercury.

[b] Parts per million (ppm) in this exhibit refers to parts per million by volume or micromoles of pollutant per mole of gas.

[1] Not to be exceeded more than once per year

[2] To attain this standard, the 3-year average of the weighted annual mean PM_{10} concentration at each monitor within an area must not exceed 50 µg/m^3.

[3] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

[4] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 65 µg/m^3.

[5] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

[6] To attain this standard, the expected number of days per calendar year with a maximum hourly average concentration above the standard must be equal to or less than one.

Non-federal entities may also establish AAQC. State and local agencies' standards must address the same pollutants as the NAAQS and must be equal to or more stringent than the NAAQS. Some state and local agencies have developed standards for additional criteria pollutants such as visibility and hydrogen sulfide.

The EPA has characterized local and regional air quality through attainment status. If the pollutant concentration in a region meets the NAAQS, it is considered to be an attainment area; if a region exceeds the NAAQS, it is considered to be a nonattainment area. Some areas may be unclassified because insufficient data are available to characterize the area. Other areas are deemed maintenance areas if the area is in attainment but NAAQS were exceeded in the past and a revised State Implementation Plan (SIP) has provided for attainment status for the 10 years after redesignation.

The CAA requires the preparation of a SIP that describes how the state will meet or attain the NAAQS. As a result of the CAA Amendments, the requirements and compliance dates for reaching attainment are based on the severity of the air quality standard violation. A Federal agency cannot support an action (e.g., fund, license) unless the activity will conform to the EPA-approved SIP for the region. Federal agencies are exempt from performing a conformity analysis if the ongoing activities do not produce emissions above the *de minimis* levels or if the Federal action is not considered regionally significant, that is, it does not equal or exceed 10 percent of the air quality control area's emissions inventory for any criteria pollutant. Exhibit 3-2 shows the *de minimis* threshold levels of various nonattainment areas.

Exhibit 3-2. Thresholds in Non-Attainment Areas

Area Designation		Pollutant	*De Minimis* Level (tons per year)
Ozone	Extreme Nonattainment	NO_X or VOC	10
	Severe Nonattainment	NO_X or VOC	25
	Serious Nonattainment	NO_X or VOC	50
	Other Nonattainment, within OTR	NO_X	100
	Other Nonattainment, within OTR	VOC	50
	Other Nonattainment, outside OTR	NO_X or VOC	100
	Maintenance	NO_X	100
	Maintenance, within OTR	VOC	50
	Maintenance, outside OTR	VOC	100
PM_{10}	Serious Nonattainment	PM_{10}	70
	Moderate Nonattainment	PM_{10}	100
	Maintenance	PM_{10}	100
CO	Nonattainment or Maintenance	CO	100
SO_2	Nonattainment or Maintenance	SO_2	100
NO_2	Nonattainment or Maintenance	NO_2	100
Pb	Nonattainment or Maintenance	Pb	25

Source: EPA regulations 40 CFR 93.153(b)

The EPA evaluates ambient air quality and calculates *de minimis* levels for emissions at or below 914 meters (3,000 feet) above ground level. Air quality modeling is used to determine the effects of air emission sources on ambient air concentrations.

Exhibit 3-3 lists the current attainment status of all the areas where FTF activities are proposed to occur.

Exhibit 3-3. Location of FTF Activity and Attainment Status

Location	State	County	Non-attainment for Pollutant
Redstone Arsenal	Alabama	Madison	In attainment
KLC	Alaska	Kodiak Island	In attainment
Elmendorf AFB	Alaska	Anchorage	Anchorage Municipality, CO – Serious Anchorage Municipality, PM_{10} – Moderate
YPG	Arizona	Yuma	Yuma, PM_{10} - Moderate
Vandenberg AFB	California	Santa Barbara and San Luis Obispo	In attainment
PMRF	Hawaii	Kauai	In attainment
Pearl Harbor	Hawaii	Oahu	In attainment
WSMR	New Mexico	Dona Ana, Otero, Sierra, Socorro, Lincoln	Anthony, PM_{10} - Moderate
Fort Wingate	New Mexico	McKinley	In attainment
Hill AFB	Utah	Davis	In attainment
USAKA/RTS	N/A	N/A	N/A
Wake Island	N/A	N/A	N/A
Misawa AB, Japan	N/A	N/A	N/A

Source: EPA, 2006c

The Republic of Marshall Islands (RMI) and Japan have established their own air quality standards. The U.S. and RMI have agreed on quality standards that are based on the CAA and are outlined in the *Environmental Standards and Procedures for U.S. Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands* (SMDC and EPA, 2004). The air quality standards and procedures are designed to maintain the current air quality at USAKA and accomplish the fundamental purposes of the CAA but they do not necessarily incorporate many of the procedural or mandatory technology-based requirements established under the CAA. The USAKA Environmental Standards state that the ambient air quality concentrations for criteria pollutants shall not exceed 80% of the National Ambient Air Quality Standards. _All significant stationary sources of criteria pollutants, hazardous air pollutants (HAPs) and activities covered by a U.S. National Emission Standard for Hazardous Air Pollutants must be governed by a Document of Environmental Protection, which is subject to review and agreement by U.S. and RMI agencies as well as public review. Likewise, the U.S. government and Japan have agreed that all activities at Misawa AB must comply with the U. S. Forces

Japan, Environmental Governing Standards (JEGS). The JEGS are a compilation of U.S. environmental law and Japan environmental standards as negotiated by the staff of U.S. Forces Japan, the U.S. State Department, and the Environmental Agency of Japan.

3.1.2 Airspace

Region of Influence. The ROI for airspace at launch locations would include commercial air corridors and the airspace over and surrounding each location.

Description. Airspace is the space above a nation, which is under its jurisdiction. Airspace is defined vertically, laterally, and temporally for aviation purposes. The categories of airspace include controlled and uncontrolled airspace, special use airspace, and other airspace. These categories are determined based on the complexity or density of aircraft movements, the nature of operations within the airspace, the level of safety required and national and public interest in the airspace.

Airspace management and use in the U.S. are governed by the Federal Aviation Act of 1958 (Public Law 85-725) and its implementing regulations set forth by the Federal Aviation Administration (FAA). FAA Order 7490, "*Policies and Procedures for Air Traffic Environmental Actions*," includes procedures and guidance for special use airspace environmental issues between FAA and DoD. FAA Order 7610.4H, "*Special Military Operations*," specifies procedures for air traffic control planning, coordination, and services during defense activities, and special military operations conducted in airspace controlled by or under the jurisdiction of the FAA.

The U.S. airspace is divided into 21 zones (centers), and each zone is divided into sectors. Also within each zone are portions of airspace, about 81 kilometers (50 miles) in diameter, called TRACON (Terminal Radar Approach CONtrol) airspaces. Multiple airports exist within each TRACON airspace, and each airport has its own airspace with an eight-kilometer (five-mile) radius.

3.1.3 Biological Resources

Region of Influence. The ROI for analysis of biological resources would include areas that might be affected by construction and operation activities at each location. The ROI would include the launch location and areas surrounding the launch pads that might be affected by noise, toxic spills, and debris.

The ROI for the flight test corridor would include the target overflight area and the potential debris impact areas on land or over the BOA.

Description. Native or naturalized vegetation, wildlife, and the habitats in which they occur are collectively referred to as biological resources. Biological resources are described in terms of terrestrial and aquatic vegetation, wildlife, threatened and endangered species, and environmentally sensitive habitats.

The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.) is the primary law that addresses biological resources. The U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration National Marine Fisheries Service administer the ESA, which states that all Federal departments and agencies shall take actions to conserve endangered species and threatened species. Included with the protection of the animals and plants themselves is a concern for their critical habitats, which is defined as specific areas within the geographical area occupied by the species at the time it is listed and also areas that are essential to conservation of the species. Currently, a total of 1312 species of animals and plants are listed as threatened or endangered in the U.S. by the USFWS and are afforded protection under the ESA. (USFWS, 2007a) The Defense Department FY2004 Authorizations bill (Public Law 108-136, Section 318) amends the ESA to allow the Secretary of the Interior to preclude DoD sites from critical habitat designations if adequate special management or protection is provided through a legally operative plan, such as an Integrated Natural Resources Management Plan is in place at the sites, funding and project implementation is certain and an actual conservation benefit to the species is provided. This determination is made solely by USFWS personnel and the Secretary of Interior. Individual States have State-listed threatened and endangered species, as well as species of special concern, that are afforded protection in accordance with State-specific regulations.

3.1.4 Cultural Resources

Region of Influence. For analysis of potential impacts on cultural resources, the ROI is synonymous with the area of potential effect as defined under cultural resources regulations (36 CFR 800.16[d], *Protection of Historic Properties, Program Alternatives*). In general, the ROI for cultural resources would encompass areas requiring ground disturbance (e.g., areas of new facility or utility construction) and all buildings or structures requiring modification, renovation, or demolition at each location.

Description. Cultural resources include prehistoric and historic artifacts, archaeological sites (including underwater sites), historic buildings and structures, and traditional resources (e.g., Native American and Native Hawaiian religious sites). Cultural resources of particular concern include properties listed or eligible for inclusion in the National Register of Historic Places (National Register). The term "eligible for inclusion in the National Register" includes all properties that meet the National Register listing criteria which are specified in Department of Interior regulations at 36 CFR 60.4. Only those cultural resources determined to be potentially significant under 36 CFR 60.4 are subject to protection from adverse impacts resulting from an undertaking. To be considered significant, cultural resources must meet one or more of the criteria established by the National Park Service that would make that resource eligible for inclusion in the National Register. Therefore, sites not yet evaluated may be considered potentially eligible to the National Register and, as such, are afforded the same regulatory consideration as nominated properties.

The National Historic Preservation Act of 1966 (16 USC 470 et seq.) establishes a national policy to preserve, restore, and maintain cultural resources. The Act establishes the National Register as the mechanism to designate public or privately owned properties deserving protection. Section 101(b)(4) of NEPA established a Federal policy for the conservation of historic and cultural, as well as the natural, aspects of the nation's heritage. Regulations implementing NEPA stipulate that Federal agencies must consider the consequences of their undertakings on historic and cultural resources. (40 CFR Part 1502.16[g]) These guidelines are typically met under Section 106 of the National Historic Preservation Act. Requirements under Section 106 include the identification of significant historic properties that may be impacted by the proposed action, as well as consultation with the State Historic Preservation Officer (SHPO), or Tribal Historic Preservation Officer.

3.1.5 Geology and Soils

Region of Influence. The ROI for geology and soils for each location would include the soil areas that would be disturbed by construction or trenching and the soil areas as well as those within each LHA that might be subject to contamination from launch exhaust emissions and/or potential contamination from unburned fuel in the event of a terminated launch.

Description. Geology and soils are earth resources that could be adversely affected by the proposed action. They play a major role in the susceptibility of an area to erosion, depletion of mineral or energy resources, seismic risk or landslide, and soil and ground water contamination that could occur as a result of the proposed action.

Geology is the study of the composition and configuration of the Earth's surface and subsurface features. The general shape and arrangement of a land surface, including its height and the position of its natural and man-made features, is referred to as topography. The topography of the land surface can influence erosion rates and the general direction of surface water and ground water flow. Geologic conditions also influence the potential for naturally occurring or human-induced hazards, which could pose risk to life or property. Such hazards could include phenomena such as landslides, flooding, ground subsidence, volcanic activity, faulting, earthquakes, and tsunamis (tidal waves). The potential for geologic hazards is described relative to each environment type's geologic setting.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their composition, slope, and physical characteristics.

Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use. In a limited number of cases, the presence, distribution, quantity, and quality of mineral resources might affect or be affected by a proposed action.

3.1.6 Hazardous Materials and Waste

Region of Influence. The ROI for potential impacts related to hazardous materials and wastes would include the areas at each location on which there would be new construction, pre-launch site preparation, launch, post-launch activities, and hazardous materials storage and handling.

Description. Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) of 1976 Section 1004(5) as “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (a) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.” While the definition refers to “solids,” it has been interpreted to include semisolids, liquids, and contained gases. (Wentz, 1989) Hazardous waste is further defined in 40 CFR 261.3 as any solid waste that possesses hazardous characteristics of toxicity, ignitability, corrosivity, or reactivity, or is listed as a hazardous waste in Subpart D of 40 CFR Part 261.

The EPA, in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (42 U.S.C. Sections 9601-9675), RCRA (42 U.S.C. 6901-6992(k)), and the Toxic Substances Control Act of 1976 (15 U.S.C. Sections 2601-2692), has regulatory control over hazardous materials and wastes. The U.S. Department of Transportation (DOT), under the Hazardous Materials Transportation Act of 1975 (49 U.S.C. Section 1801, Parts 172-173), regulates the transportation of hazardous materials and wastes. The Occupational Safety and Health Administration (OSHA), under the Williams-Steiger Occupational Safety and Health Act of 1970 (29 U.S.C. 65), regulates the storage, handling, and workplace operations involving hazardous materials and wastes.

3.1.7 Health and Safety

Region of Influence. The ROI for considering impacts to the health and safety of workers would include the immediate work areas of each location, including construction areas; areas associated with missile storage, assembly, and transfer; the launch sites; and areas associated with post-launch activities.

The ROI for potential impacts to public health and safety would include the launch location, as well as off-range areas that could be affected by FTF activities involving preflight transport of missile components, missile launch, and missile flight. A launch failure could potentially involve an explosion, missile debris, release of toxic materials into the air or water, high noise levels, and/or fire.

Description. Health and safety includes consideration of any activities, occurrences, or operations that have the potential to affect the well-being, safety, or health of workers or members of the general public. Workers are those persons directly involved with the operation producing the effect or who are physically present at the operational site. Members of the general public are persons who are not physically present at the operational site, including workers at nearby locations not involved in the operation and the off-site population. Also included in this category are equipment, structures, flora, and fauna. The standards applicable to the evaluation of health and safety differ for workers and the general public; therefore the resource is described in terms of occupational health and safety (workers) and environmental health and safety (general public).

Federal military ranges would have specific regulations to ensure the health and safety of members of the range as well as the public in the surrounding area. Compliance with Federal, state and local safety regulations would be required for the transport, receipt, storage, and handling of hazardous materials.

3.1.8 Land Use

Region of Influence. The ROI for land use would include the regions within and adjacent to the boundaries of each location that could potentially be affected by the launch of FTF targets and the construction, modification, and operation of support facilities associated with the proposed action.

Description. Land use is described as the human use of land resources for various purposes, including economic production, natural resource protection, or institutional uses. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are permissible or protect specially designated or environmentally sensitive uses. Planning departments at the local and municipal level typically designate land uses for specific areas, which describe the permitted development activities that are acceptable for the area, such as residential, commercial, and industrial uses.

The Coastal Zone Management Act of 1972 (16 U.S.C. 1451-1456) seeks to preserve, protect, and restore coastal areas. Coastal areas include wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat. All Federal agencies must assess whether their activities will affect a coastal zone and ensure, to the maximum extent possible, that the activities are consistent with approved state Coastal Zone Management Plans. The Farmland Protection Policy Act (FPPA) of 1981 is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Through consultation with the U.S. Department of Agriculture Natural Resources Conservation Service, the FPPA assures that—to the extent possible—Federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland; it can be forest land, pastureland, cropland, or other land, but not water or urban developed land.

3.1.9 Noise

Region of Influence. The ROI for noise analysis would be the area surrounding each location within which humans and/or wildlife may suffer annoyance or disturbance from launches and other noise sources at that location.

Description. Noise is generally defined as unwanted sound that is typically associated with human activity. Three characteristics are used to measure noise: amplitude, frequency, and duration. Amplitude is the intensity of noise and is described in units called decibels (dB). Frequency measures the number of wavelengths that are received over a period of time. High frequency noises have a high number of wavelengths per time period (e.g., 1 second), and low frequency noises have fewer wavelengths per time period. Examples of high frequency noises are those from jet engines or train whistles. Low frequency noises can be sonic booms and blast noises. Duration is the length of time over which the noise continues.

A-weighted decibels (dBA). Most measures of noise for community planning purposes use dBA units, and are used to characterize noise as heard by the human ear. It accomplishes this by artificially lowering the sound at lower and higher frequencies, where the human ear is less sensitive to sound reception. The dBA is used to assess human reaction to single event noise and is averaged over a 24-hour period to predict community reaction.

Community Noise Equivalent Level (CNEL). The CNEL describes the average sound level during a 24-hour day in dBA. For noises occurring between 7:00 p.m. and 10:00 p.m., five dBA are added to the measured noise level, and for noises occurring between 10:00 p.m. and 7:00 a.m., 10 dBA are added to the measured noise level.

Day/Night average sound Level (DNL). DNL is the average sound level during a 24-hour day. It is reported in dBA and is used to predict human annoyance and community reaction to unwanted sound (noise). Because humans are typically more sensitive to noise in the evening, the DNL places a 10 dBA penalty on noise produced between the hours of 10:00 p.m. and 7:00 a.m.

Equivalent Noise Level. Equivalent noise level is the energy mean A-weighted sound level during a stated measurement period. It is used to describe the time-varying character of environmental noise.

Noise from transportation sources, such as vehicles and aircraft, and from continuous sources, such as generators, is assessed using the A-weighted DNL, which significantly reduces the measured pressure level for low-frequency sounds and some high-frequency sounds. Impulse noise resulting from armor, artillery, and demolition activities is assessed in terms of the C-weighted DNL. The C-weighted DNL is often used to characterize high-energy blast noise and other low frequency sounds capable of inducing vibrations in buildings or other structures. The C-weighted scale does not significantly reduce the measured pressure level for low frequency components of a sound.

Noise levels are regulated by Federal, state, and local ordinances and regulations. Federal standards include the OSHA 8-hour time weighted average level of 85 dB to protect worker health and safety, as well as the EPA 24-hour time weighted average level of 65 dBA.

3.1.10 Socioeconomics and Environmental Justice

Region of Influence. The ROI for socioeconomics would be the communities located within and/or adjacent to each launch site and key population centers near those sites.

The ROI for environmental justice would include any minority or low-income populations near proposed FTF activity locations that could experience long-term health, environmental, cultural, or economic effects that have a disproportionately high and adverse effect on those populations, in relation to all nearby residents.

Description. Socioeconomics encompasses the social, economic, and demographic variables associated with community growth and development. Socioeconomic resources consist of several primary elements including population, employment, and income. Other socioeconomic aspects that are described often may include housing and employment characteristics, and an overview of the local economy.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* tasks Federal agencies to make achieving environmental justice part of their mission by identifying and addressing disproportionately high and adverse public health or environmental effects of programs, policies, and activities on minority and low-income populations. Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, directs Federal agencies, as appropriate and consistent with the agency's mission, to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children.

3.1.11 Transportation and Infrastructure

Region of Influence. The ROI for transportation resources addressed in this EA would include the ground, ocean, and aviation transport systems within or immediately adjacent to each of the proposed sites well as the areas potentially affected by the transportation of FTF targets to launch destinations.

The ROI for infrastructure would encompass the areas within or immediately adjacent to each of the proposed sites and local communities served by the infrastructure. The ROI also includes the area/region defined and served by the specific utility purveyors.

Description. Transportation generally refers to the movement of people and goods. Regulations pertaining to transportation are implemented by DOT and are located in Title 49 of the CFR. Title 49 includes regulations applicable to railroads (49 CFR 200-299), highways (49 CFR 300-399; 49 CFR 500-599), transportation safety (49 CFR 800-899), hazardous material transportation (49 CFR 171-180), and surface transportation generally (49 CFR 1000-1199).

Infrastructure encompasses public and private utilities, and their capacity to accommodate the movement of people and goods. Infrastructure includes roadways, railways, ports, and airports. Within the context of infrastructure, goods include water, power, fuel, communications, waste disposal, and other vital services.

3.1.12 Visual Resources

Region of Influence. The ROI for visual resources would be the viewshed areas within and surrounding each site including land area and adjacent ocean area.

Description. Visual resources are defined as the natural and man-made features that constitute the aesthetic qualities of an area. Landforms, surface water, vegetation and human-made features are the fundamental characteristics of an area that define the visual environment and form the overall impression that an observer receives of an area.

The importance of visual resources and any changes in the visual character of an area are influenced by social considerations, including the public value placed on the area, public awareness of the area, and community concern for the visual resources in the area. The visual resources of an area and any proposed changes to these resources can be evaluated in terms of "visual dominance" and "visual sensitivity." Visual dominance describes the level of noticeability that occurs as the result of a visual change in an area. The levels of visual dominance vary from "not noticeable" to a significant change that demands attention and cannot be disregarded. Visual sensitivity depends on the setting of an area. The significance of visual effects is subjective and depends upon the degree of alteration, the scenic quality of the area disturbed, and the sensitivity of the viewers. Changes in the existing landscape where there are no identified scenic values or sensitive viewers are considered less than significant. Visual changes may be considered significant if proposed development is inconsistent with existing goals and policies of jurisdictions in which the project is located.

3.1.13 Water Resources

Region of Influence. The water resource ROI would include those surface water bodies (i.e., streams, lakes and saltwater-influenced lagoons), drainage areas, and ground water resources that may be affected by construction or operations proposed at each location. Targets launched from the locations could also affect the BOA in areas below target intercept points, and/or in other areas if targets unexpectedly do not reach their destination.

Description. Water resources include surface freshwater and marine systems (the marine system includes the BOA that is not under the direct jurisdiction of any single nation), wetlands, floodplains, and ground water. Water resources are dependent upon a combination of factors that include precipitation, climate, geology, and topography.

Surface waters are defined as waters that are open to the atmosphere, and include oceans, rivers, lakes, streams, estuaries, reservoirs, or other collectors that are influenced by surface waters. For the purposes of analysis, the BOA is defined as the open water areas of the Pacific and Atlantic Oceans located outside of the 19-kilometer (12-mile) territorial seas. The BOA is subject to EO 12114, *Environmental Effects Abroad of Major Federal Actions,* which requires consideration of Federal actions abroad with the potential for impacts to the environment. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Storm water flow may be exacerbated by high proportions of impervious surfaces (e.g., buildings, roads, and parking lots) and is important to the management of surface water. Storm water also is important to surface water quality because of its potential to introduce sediments and other contaminants into lakes, rivers, and streams.

For regulatory purposes under the Clean Water Act (CWA) of 1972 (33 U.S.C. 26 et seq.), the term wetlands means "those areas that are inundated or saturated by surface or ground water 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.

Floodplains consist of the low-lying areas adjacent to rivers and streams that are subject to natural inundations typically associated with precipitation. Ground water is defined as water, both fresh and saline, that is located beneath the Earth's surface.

The CWA regulates all discharges into "waters of the United States" with the goal to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The EPA, in accordance with the CWA, regulates and delegates authority to the States to implement water quality standards. The U.S. Army Corps of Engineers (USACE), in accordance with Section 404 of the CWA, oversees the consultation and permitting process for activities that may result in discharges of dredged or fill material into waters of the U.S., including wetlands.

The next sections provide site-specific environmental baseline information for the sites that could support the FTF Program.

3.2 Redstone Arsenal

Redstone Arsenal is located in Huntsville, Alabama and houses the Redstone Army Airfield. Redstone Arsenal is the originating airport for all FTF shipments to launch/staging locations around the world. The only FTF-related activities that will take place are the loading of the target shipments onto C-17 and C-5 aircraft for transport. Therefore, only the air quality airspace resource area is included in this EA. The ROI for Redstone Arsenal was assumed to include the air shed surrounding the Redstone Arsenal air field. For Redstone Arsenal, the only resource area that would be affected by the transportation of FTF target shipments from and back to the on-site air field would be air quality as discussed below.

3.2.1 Air Quality

Redstone Arsenal is located in Madison County, Alabama, which is in attainment or unclassifiable for all criteria air pollutants. There are no Class I Prevention of Significant Deterioration areas within 10 kilometers (6 miles) of Redstone Arsenal.

Redstone Arsenal submitted its Title V permit application in 1998 that consolidates current air permits for numerous small particulate and VOCs (Redstone Arsenal, 1997). Alabama has adopted the NAAQS as its AAQS.

Redstone Arsenal maintains permits to operate several air pollution emissions sources including boilers, fuel storage tanks, a propellant sparging unit, and an incinerator. Operations at Redstone Arsenal are in compliance with current state and Federal permits. (U.S. Army Space and Missile Defense Command (SMDC), 1999b)

3.3 Kodiak Launch Complex, Alaska

The KLC is a commercial launch complex operated by the AADC licensed by the FAA. It is located on the eastern side of Kodiak Island, on a peninsula called Narrow Cape. It is approximately 40 miles from the nearest population center (Kodiak City and the U.S. Coast Guard Station, Kodiak). The KLC occupies 17.4 hectares (43 acres) within a 1,504-hectare (3,717-acre) parcel of state-owned property and consists of a Launch Control and Management Center, Payload Processing Facility, Integration and Processing Facility, Spacecraft Assemblies Transfer Facility, Launch Pad and Service Structure. Support facilities at KLC include access roads, water, power, communications and sewage disposal. Also located at the facility is a U.S. Coast Guard Loran "C" Station. (MDA, 2003a)

For purposes of this document, all of the resources at the KLC are incorporated by reference from the GMD ETR EIS [(MDA, 2003a)]. Exhibit 3-4 presents the documents incorporated by reference for each of the resource areas.

Exhibit 3-4. Resource Area Descriptions of Affected Environment for KLC

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	GMD ETR EIS
Airspace		
Biological Resources		
Cultural Resources		
Geology and Soils		
Hazardous Materials and Waste		
Health and Safety		
Land Use		
Noise		
Socioeconomics and Environmental Justice		
Transportation and Infrastructure		
Visual Resources		
Water Resources		

Brief descriptions of these resource areas are provided below.

3.3.1 Air Quality

Existing ranching, occasional vehicular traffic, occasional operations of two standby generators, and periodic use of KLC for launch vehicles contribute to the condition of air quality in the region. The primary air contaminant on the island is wind-blown volcanic dust. Kodiak Island is classified as a Class II attainment area. It is part of a larger area that is in attainment with NAAQS. (MDA, 2003a)

3.3.2 Airspace

The closest controlled airspace is Kodiak Airport, located approximately 40 kilometers (25 miles) northeast of KLC. Kodiak Airport is classified as Class C and D airspace. Airspace above KLC up to flight level (FL) 180 is uncontrolled Class G airspace, while airspace above FL 180 is controlled airspace. Air traffic in the vicinity of KLC is regulated by the Anchorage Air Route Traffic Control Center (ARTCC) and the Kodiak Air Traffic Control Tower.

3.3.3 Biological Resources

Kodiak Island is located within the Narrow Cape region. Predominant vegetation types in this area include hairgrass-mixed forb and open willow-hairgrass-mixed forb meadow, shrublands, wetlands, and intermittent stands of spruce. Grazing from farmed cattle, bison, and horses has affected the vegetation community structure. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC. The KLC site provides habitat for about 143 species of birds, including the bald eagle, which is protected by the Bald and Golden Eagle Protection Act. Approximately 12 percent of the KLC site is occupied by open water including small streams, two freshwater lakes, and a series of lagoons. No federally proposed or listed candidate, threatened, or endangered species are located within the boundaries of KLC.

3.3.4 Cultural Resources

A 1994 archeological survey in and around the KLC site did not identify any evidence of cultural resources. Two archeological sites and a World War II bunker complex are located within approximately 1.6 kilometers (1 mile) of KLC. Palentological resources, including shallow water marine invertebrates of the Oligocene and Miocene age, are generally found in the Narrow Cape formation located below the surface soils. (MDA, 2003a)

3.3.5 Geology and Soils

The geology in the area consists of siltstone, fine and medium lethic sandstone, pebbly sandstone and conglomerate. The soil formations in the upland region are composed of weathered bedrock covered by volcanic ash. The soils in the valleys near KLC are a combination of Seatry peat and Ugak silt loam soils.

Kodiak Island is located on the upper plate of the Aleutian subduction zone which includes several active fault systems. The U.S. Coast Guard Civil Engineering Unit identified four active faults or zones of faults capable of generating large magnitude earth quakes at Narrow Cape. There are no active volcanoes on Kodiak Island. A landslide approximately 430 meters (1400 feet) long is located just north of KLC. (MDA, 2003a)

3.3.6 Hazardous Materials and Waste

KLC has above ground storage tanks for diesel fuel storage. Petroleum, oil, and lubricant storage are in accordance with EPA requirements at 40 CFR 112, and State of Alaska requirements at 18 Alaska Administrative Code (AAC) 75. KLC does not use underground storage tanks (USTs). Fuels are handled and stored in adherence to KLC Safety Policy, KLC Emergency Response Plan, and KLC Contamination Control Procedures.

Wastes are handled, transported, and disposed of in accordance with Alaska Aerospace Development Corporation's (AADC's) HazCom Program, KLC Safety Policy, KLC Contamination Control Procedures, and applicable state and Federal environmental laws. Pollution prevention, waste minimization and recycling procedures are indicated in the KLC Spill Prevention Control and Countermeasures (SPCC), Emergency Response Plan and Contamination Control Procedures.

AADC is authorized to operate KLC as a Small Quantity Generator according to the Alaska Hazardous Waste Management Regulations (18 AAC 62). With this designation, KLC can produce no more than 998 kilograms (2,220 pounds) of hazardous waste per month, which normally amounts to just under five drums of liquid hazardous waste.

3.3.7 Health and Safety

KLC has standard range safety procedures in place to provide for ground safety, flight safety, range clearance and surveillance, sea-surface area clearance and surveillance, and commercial air traffic control. Each launch at KLC has an established flight termination line to minimize potential adverse impacts on populated areas. The Division of Emergency Services, Alaska Department of Military and Veterans Affairs, has developed a *Kodiak Area Operations Plan* to direct preparation for, response to, mitigation of, and recovery from natural and man-caused disaster emergencies within the Kodiak Island Borough, including KLC.

3.3.8 Land Use

KLC is located within the Kodiak Island Borough on a 1,504 hectare (3,717 acre) coastal plateau leased and managed by the AADC from the Alaska Department of Natural Resources, Division of Land through an Interagency Land Management Agreement. KLC consists of primary facilities and a number of support facilities that cover approximately 17 hectares (43 acres). Approximately 1 percent of KLC is considered disturbed, leaving the remainder in its natural state.

The Pasagshak State Recreation Area is located approximately 10 kilometers (6 miles) northwest of KLC. A number of hiking trails are in the vicinity of KLC. Fossil Beach and East Twin Lake are located on KLC and offer limited access for general beach activities. The KLC is located in the "zone of direct influence" of the coastal environment. All Federal development projects and all Federal activities must be reviewed to determine their consistency with the local Coastal Zone Management Plan. (MDA, 2003a)

3.3.9 Noise

Based on the land use of the Narrow Cape area, the most common man-made noise is from occasional traffic on the road from the City of Kodiak to Narrow Cape, from nearby off-road recreational vehicles, intermittently, from standby generators at the nearby U.S. Coast Guard Loran Station, and occasional rocket launches.

Sensitive human receptors from activities at KLC are located at Kodiak Ranch (the nearest residence), a distance of 3 kilometers (2 miles), and Pasagshak State Recreation Area (the nearest public facility), a distance of 10 kilometers (6 miles). Wildlife receptors are located at the shoreline around Narrow Cape and Ugak Island at or near the water surface. (MDA, 2003a)

3.3.10 Socioeconomics and Environmental Justice

As of 2000, the population of the Kodiak Island Borough was 13,913 people. The population of the island is concentrated in the City of Kodiak, where about half of the population resides. The closest population center to KLC is Cape Chiniak with a population of 50 people. As reported in 2002, the per capita income of Kodiak Island Burough residents was only marginally lower than the statewide average. (MDA, 2003a)

Kodiak is consistently one of the top fishing ports in the U.S. both in terms of quantity and value. Roughly one third of the population is employed by the seafood industry. Employment levels fluctuate throughout the year largely based on the fishing industry. The largest government employer is the U.S. Coast Guard.

Census data show the borough population as 30.2 percent minority (non-white) and Kodiak City as 36.7 percent minority. Approximately 57 percent of the borough's total minority population resides in Kodiak City. There are six traditional villages on the island, considered minority communities under the Executive Order. The population of these villages is more than 83 percent Native American, predominantly Aleut. (MDA, 2003a)

3.3.11 Transportation and Infrastructure

Kodiak Airport, the closest airport to KLC, is located approximately 64 kilometers (40 miles) north of KLC by road. Kodiak Airport is fully instrumented and operates three runways. In terms of ocean transportation, Kodiak Island offers a full range of dockage and marine services for commercial fishing, cargo, passenger, and recreational vessels. (MDA, 2003a)

From Kodiak, access to KLC is via Rezanof Drive West (also referred to as the Chiniak Highway) and Pasagshak Point Road. At present, all but the final 14.5 kilometers (9 miles) of this road have been paved. The last 14.5 kilometers (9 miles) are scheduled to be paved by fall 2007. All launch-related deliveries must be transported over this road, unless the option is made to use barge transport. Roadways supporting the individual facilities within KLC are designed to accommodate tractor-trailer transport vehicles as well as passenger vehicles and light trucks. Access roads within KLC are either improved or paved with asphalt.

3.3.12 Visual Resources

Kodiak Island consists primarily of mountainous terrain, with most mountain peaks ranging from 914 to 1,219 meters (3,000 to 4,000 feet) high. The Narrow Cape area of Kodiak Island, in the vicinity of KLC, has low, grass-covered mountains that level off into a plateau. The varied terrain, extensive vegetative cover, and generally scenic shorelines all contribute to a high visual quality for much of Kodiak Island. The Narrow Cape area has been previously disturbed by commercial launch facilities, a ranch, and a U.S. Coast Guard facility.

Narrow Cape is in a relatively remote area of Kodiak Island. Potentially concerned persons who may have views of KLC include recreational users (i.e., fishers, hunters, hikers, etc.); employees and visitors at the U.S. Coast Guard Loran-C station, Kodiak Ranch, and KLC; and passengers on offshore vessels. Pasagshak State Recreation Area, a small park containing seven campsites, is about 10 kilometers (6 miles) northwest of Narrow Cape. Approximately a dozen small vacation homes are located in the Pasagshak Bay area. The Kodiak Island Highway, which runs from Kodiak to Narrow Cape, is primarily undeveloped.

3.3.13 Water Resources

Kodiak Island has a marine climate with many natural streams, lakes, and lagoons. Most of the ground water in the coastal area near KLC is in an unconfined aquifer composed of sand and gravel. The primary potable water sources for existing KLC operations are wells on KLC. West and East Twin Lakes have been used for construction water. KLC is in a fairly remote area, with other nearby water uses limited to a ranch and a local business. The town of Kodiak has its own water supply and treatment system and is located approximately 40 kilometers (25 miles) to the north.

3.4 Vandenberg Air Force Base, California

Vandenberg AFB has been identified as a location for land launches of the FTF under the proposed action. Vandenberg AFB comprises more than 39,660 hectares (98,000 acres) within Santa Barbara County, California and is located approximately 89 kilometers (55 miles) north of the city of Santa Barbara near Lompoc, and 225 kilometers (140 miles) northwest of Los Angeles. The host unit at Vandenberg AFB is the 30th Space Wing, which is responsible for deploying expeditionary forces and launching satellites into orbit. Vandenberg AFB also provides launch facilities for testing intercontinental ballistic missiles and conducts military, National Aeronautics and Space Administration, and commercial space launches. (MDA, 2003a)

The resources at Vandenberg AFB are incorporated by reference from the Booster Verification Tests EA (Ballistic Missile Defense Organization, 1999), GMD ETR EIS [GMD ETR EIS, (MDA, 2003a)] and the Mobile Sensors EA (MDA, 2005). Exhibit 3-5 presents the documents incorporated by reference for each of the resource areas.

Exhibit 3-5. Resource Area Descriptions of Affected Environment for Vandenberg AFB

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	Mobile Sensors EA
Airspace	Yes	Mobile Sensors EA
Biological Resources	Yes	Mobile Sensors EA
Cultural Resources	Yes	GMD ETR EIS
Geology and Soils	Yes	GMD ETR EIS
Hazardous Materials and Waste	Yes	GMD ETR EIS
Health and Safety	Yes	GMD ETR EIS
Land Use	Yes	GMD ETR EIS
Noise	Yes	GMD ETR EIS
Socioeconomics and Environmental Justice	Yes	GMD ETR EIS
Transportation and Infrastructure	Yes	GMD ETR EIS
Visual Resources	Yes	Booster Verification Tests EA
Water Resources	Yes	GMD ETR EIS

Brief descriptions of these resource areas are provided below.

3.4.1 Air Quality

Vandenberg AFB is part of the South Central Coast Air Basin and is located in the Santa Barbara County Air Pollution Control District. Santa Barbara County is considered to be in attainment for all AAQS except for California's state AAQS for ozone and PM_{10}, as determined by the California Air Resources Board. Santa Barbara County has recently been re-designated by the EPA as being in attainment for both the 1-hour and 8-hour ozone standards. (MDA, 2005)

3.4.2 Airspace

With the exception of special use airspace, the domestic airspace in the ROI is considered controlled airspace and comprises Class A airspace from 18,000 feet above MSL, up to and including FL 600 (60,000 feet), and Class E airspace below 18,000 feet. The Class A and E airspace also includes designated international Airspace.

The Vandenberg AFB (Western Range) airspace ROI comprises four Restricted Areas, each extending to an unlimited altitude, immediately above and around Vandenberg AFB; two Restricted Areas over San Nicolas Island; and 27 separate Warning Areas off the coast of southern California. The airspace ROI within the 12-nautical mile territorial Waters of the U.S. is managed by the Los Angeles ARTCC, which also controls the Restricted Areas and the offshore Warning Areas. (MDA, 2005)

3.4.3 Biological Resources

Vandenberg AFB occupies a transition zone between the cool, moist conditions of northern California and the semi-desert conditions of southern California. Plant communities include central coastal sage scrub, chaparral, grassland, wetlands, eucalyptus (non-native woodland), and ruderal areas. Coastal strand occurs along Vandenberg AFB's beaches. Native beach plants include beach saltbush, sea rocket, sand verbena, beach morning glory, and beach burr.

Vandenberg AFB has a number of habitat types that support a rich diversity of wildlife, including striped skunks, bobcats, and pacific tree frogs. The coastline, near shore waters, and Channel Islands also support a wide variety of aquatic life, including marine mammals, birds, and fish. There are a number of federally threatened and endangered plant and animal species that may be found within the vicinity of Vandenberg AFB. Exhibit 3-6 presents the threatened or endangered species known or expected to occur in the vicinity of the proposed action.

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Exhibit 3-6. Threatened and Endangered Vegetative and Wildlife Species Known or Expected to Occur at Vandenberg AFB

Common Name	Scientific Name	State Status	Federal Status
Plant Species			
Beach Layia	*Layia carnosa*	E	E
Gambel's watercress	*Rorippa gambellii*	T	E
Gaviota tarplant	*Dienandra increscens* ssp. *villosa*	E	E
Lompoc yerba santa	*Eriodictyon capitatum*	R	E
Animal Species			
American peregrine falcon	*Falco peregrinus anatum*	E/FP	D
Bald eagle	*Haliaeetus leucocephalus*	E/FP	T/PD
Belding's Savannah sparrow	*Passerculus sandwichensis*	E	-
California brown pelican	*Pelecanus occidentalis californicus*	E/FP	E
California least tern	*Sterna antillarum browni*	E/FP	E
California red-legged frog	*Rana aurora draytonii*	SCS	T
Coho salmon	*Oncorhynchus kisutch*	E	T
Least Bell's vireo	*Vireo bellii pusillus*	E	E
Mountain plover	*Charadrius montanus*	CSC	PT
Southern sea otter	*Enhydra lutris nerei*	FP	T
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E
Steelhead trout	*Onchorynchus mykiss*	-	T
Tidewater goby	*Eucyclogobius newberryi*	CSC	E/PD
Unarmored three-spine stickleback	*Gasterosteus aculeatus williamsoni*	E/FP	E
Western snowy plover	*Charadrius alexandrinus nivosus*	CSC	T
Whale, Blue	*Balaenoptera musculus*	-	E
Whale, Finback	*Balaenoptera physalus*	-	E
Whale, Humpback	*Megaptera novaengliae*	-	E
Whale, Right	*Eubalaena japonica*	-	E
Whale, Sei	*Balaenopter aborealis*	-	E
Whale, Sperm	*Physeter macrocephalus*	-	E

Source: MDA, 2005; U.S. Department of the Air Force, 2007
E=Endangered; R=Rare; T=Threatened; P=Proposed; D=Delisted; FP=Fully Protected; CSC=California Species of Concern

The USFWS considered the designation of critical habitat for snowy plovers nesting along the beaches of Vandenberg AFB but determined that such a listing was not needed in accordance with 2005-2006 revisions to the Sikes Act. USFWS determined that appropriate conservation measures were in place through the VAFB Integrated Natural Resources Management Plan (INRMP) (draft), and that a conservation benefit to the western snowy plover was provided by the INRMP. VAFB developed a management plan in cooperation with USFWS for beach closures during the snowy plover nesting season (1 March through 30 September).

Along with a network of swales, several wetlands (including two man-made) occur near Building 1819; the closest is approximately 1.6 kilometers (1 mile) to the northwest. These wetlands, ranging between 0.8 and 2.8 hectares (2 and 7 acres) in size, support such typical species as arroyo willow, wide-leaf cattail, California bulrush, water smartweed, and bog rush. (MDA, 2003a)

3.4.4 Cultural Resources

Numerous archaeological surveys at Vandenberg AFB have identified approximately 2,200 prehistoric and historic cultural sites. Prehistoric sites include dense shell middens, stone tools, village sites, stone quarries, and temporary encampments. Historic artifacts include those typically used in mission establishment, ranching, and military activities.

Cultural resource sites located in this area include the site of the former Rancho Guadalupe, which dates from the mission period. Vandenberg AFB currently manages 110 early historic structures and 77 historic Cold War-era facilities. The latter Cold War sites have been determined eligible for listing on the National Register as the result of consultation with the SHPO.

Vandenberg AFB manages approximately 140 Native American traditional cultural properties. Several Chumash-related traditional resources sites have been identified at Vandenberg AFB including villages and campsites, rock art panels, and burial grounds. The Miocene Monterey Formation and Later Miocene (13 to 25 million years before present) deposits identified at northern Vandenberg AFB have yielded imprints of algae, fish fragments, coprolite, and whalebone. (MDA, 2003a)

3.4.5 Geology and Soils

Vandenberg AFB is located in the Santa Maria Basin, which is bounded on the northeast by the San Rafael Mountains of the Southern Coast Ranges, on the south by the Santa Ynez Mountains of the Western Transverse Ranges, and on the west by the Pacific Ocean. Vandenberg AFB is underlain by marine sedimentary rocks of Late Mesozoic age and Cenozoic age. Surficial deposits at Vandenberg AFB are highly variable and range from weathered bedrock to stream terrace, alluvial fan, and aeolian sheet sands.

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. The Western Transverse Ranges, inclusive of the continental borderlands, have historically been in a moderately high seismic region. Vandenberg AFB is located in a Seismic Zone IV, as defined by the Uniform Building Code, characterized by areas likely to sustain major damage from earthquakes, and corresponds to intensities of VIII or higher on the Modified Mercalli Scale. (MDA, 2003a)

3.4.6 Hazardous Materials and Waste

Numerous types of hazardous materials are used to support the various missions and general maintenance operations at Vandenberg AFB. Hazardous materials obtained from off base suppliers are coordinated through Vandenberg AFB's Hazmart Pharmacy in accordance with 30 SW Hazardous Materials Management Plan. Categories of hazardous materials used during current launch activities include POL, VOCs, corrosives, refrigerants, adhesives, sealants, epoxies, and propellants.

Spills of hazardous materials are covered under the Hazardous Materials Emergency Response Plan. Hazardous wastes at Vandenberg AFB are regulated by the RCRA (Title 40 CFR 260-280) and the California EPA Department of Toxic Substances Control. USTs and aboveground storage tanks (ASTs) at Vandenberg AFB are installed and maintained in compliance with appropriate local, state, and Federal standards and regulatory requirements. The Vandenberg AFB *Hazardous Waste Management Plan* (dated 15 November 2000), specify all procedures for sampling, handling and disposing of lead-based paint and polychlorinated biphenyls (PCBs). Existing procedures assure safe handling of liquid propellants and other toxic materials. Current operations include storage and handling of ground-based interceptors (GBI) and exoatmospheric kill vehicle propellants.

3.4.7 Health and Safety

Vandenberg AFB has implemented an aggressive safety evaluation and control system, based on more than 40 years experience in test and evaluation. Vandenberg AFB possesses significant emergency response capabilities that include its own Fire Department, Disaster Control Group, and Security Police Force, in addition to contracted support for handling accidental releases of regulated, hypergolic propellants and other hazardous substances. The Readiness Flight (30 CES/CEX) manages the overall base emergency response program and is responsible for developing and updating the Vandenberg AFB Hazardous Material Emergency Response Plan. Regionally, Santa Barbara County prepared a Hazardous Material Response Plan that is used for countywide disaster response.

3.4.8 Land Use

Vandenberg AFB, located in western Santa Barbara County in south central California, is approximately 88 kilometers (55 miles) northwest of Santa Barbara, and 225 kilometers

(140 miles) northwest of Los Angeles. The base's 39,660 hectares (98,000 acres) are approximately 6 percent of the total land area of Santa Barbara County. Numerous communities are located within 16 kilometers (10 miles) of the base but are separated by wide buffers of agricultural areas. Because of its Federal status, Vandenberg AFB determines its own land use and zoning regulations.

Approximately 5 percent of the base has been disturbed, leaving the remainder in its natural state. According to its Comprehensive Plan, the base has allocated the following land use areas: airfield operations and maintenance, space and missile launch, industrial, outdoor recreation, open space, airfield, and cantonment recreational activities in the vicinity. Two public access parks that exist on or immediately adjacent to the base include Point Sal Beach State Park, which borders the northern most boundaries, and Ocean Beach County Park located approximately midway along the coast edge of Vandenberg AFB. Both provide opportunities for picnicking, surf fishing, and general beach activities. (MDA, 2003a)

3.4.9 Noise

The immediate area surrounding Vandenberg AFB is largely composed of undeveloped and rural land, with some unincorporated residential areas in the Lompoc and Santa Maria valleys and Northern Santa Barbara County. The cities of Lompoc and Santa Maria, which make up the two urban areas in the region, support a small number of localized industrial areas. Sound levels measured for the area are typically low, except for higher levels in the industrial areas and along transportation corridors.

Noise at Vandenberg AFB is typically produced by automobile and truck traffic, aircraft landings and takeoffs, and space vehicle launches. Railroad traffic is also a significant source of noise. Existing noise levels on Vandenberg AFB are typically low; the higher levels occur near industrial facilities and transportation routes. Vandenberg AFB follows state regulations concerning noise and maintains a CNEL equivalent to 65 dBA for off-base areas. Missile launches from Vandenberg AFB produce less frequent but more intense sources of noise in the region. (MDA, 2003a)

3.4.10 Socioeconomics and Environmental Justice

As reported in 2002, the total population of Santa Barbara County was 399,347. The city of Santa Barbara, with a population of 92,325 people as of 2000, was the largest city in the county and contained 23.1 percent of the county population. The U.S. Bureau of the Census reported that the per capita income in Santa Barbara County was slightly higher than the average per capita income of the state. Of the 2000 total population of Santa Barbra County, 109,022 persons (27.3 percent) were minority and 58,305 persons (14.6 percent) were low-income as defined by the U.S. Census Bureau criteria.

Retail and service industries employ approximately 60 percent of the workforce within Santa Barbra County. Major employers in this area include the University of California, Vandenberg AFB, Lockheed Martin, Vons/Williams Brothers Stores, and Raytheon Systems. The University of California, Santa Barbara has an enrollment of 19,000 students and is the area's largest employer with 8,660 employees. Vandenberg AFB employs over 1,500 civilian workers and has a military population of 3,600. (MDA, 2003a)

3.4.11 Transportation and Infrastructure

There are four airports within the surrounding area of Vandenberg AFB, including Santa Barbara Municipal, Santa Ynez, Lompoc, and Santa Maria Public airports. Vandenberg AFB also maintains its own runway, which is capable of handling large aircraft.

Vandenberg AFB is accessible by U.S. 101, which connects the base with San Francisco to the north and Santa Barbara to the south. SR-1, SR-135, and SR-246 provide access to the base from U.S. 101. The major roads on Vandenberg AFB that provide access to the project sites are Coast Road, Bear Creek Road, 13th Street, and Ocean Avenue.

Rail transport includes the Southern Pacific, Santa Maria Valley, and the Ventura County Railroad companies, which provide service to the cities of Santa Maria, Lompoc, Santa Barbara, San Luis Obispo, and Ventura. Three branch lines connect Vandenberg AFB to the Southern Pacific Railroad main line. (MDA, 2003a)

3.4.12 Visual Resources

Visual resources at Vandenberg AFB include natural and man-made features. The environment at Vandenberg AFB incorporates a number of diverse visual elements. The 35-mile stretch of coastline includes rocky headlands, coastal bluffs, and sandy beaches. A large dune complex, rolling hills, erosional valleys, and a broad sweeping mesa are found on North Base while the Transverse Range is a major mountain feature on South Base. Man-made elements are scattered throughout the base. Space and missile launch complexes are located near the coast, and radar towers, telemetry stations, and supporting utilities are distributed widely. (Ballistic Missile Defense Organization, 1999)

3.4.13 Water Resources

Rainfall at Vandenberg AFB is relatively light, ranging from approximately 29 centimeters (11.5 inches) per year along the coast to about 32 centimeters (12.5 inches) per year further inland near Lompoc. (MDA, 2003a) There are several small streams and tributaries, which are often only flowing during or after rainfall, that drain large areas. Additionally, numerous ponds and man-made lakes are found on the base. Shuman Canyon Creek is located in the vicinity of LF-06 and LF-05 launch pads. Two lakes, ABRES-A and MOD III, are located south of the proposed launch sites. Ground water in the vicinity of Vandenberg AFB is found in the San Antonio Creek ground water basin, which underlies the northern part of Vandenberg AFB. Smaller, isolated aquifers are found beneath alluvial fans on the base or in perched aquifers at higher elevations. The Vandenberg AFB water supply primarily comes from surface water purchased from the California Department of Water Resource's State Water Project. Four wells that tap the San Antonio Creek ground water basin are only used as a supplemental supply.

3.5 Pacific Missile Range Facility, Hawaii

The main base portion of the PMRF is located on the western side of Kauai, approximately 222 kilometers (120 nautical miles) from Pearl Harbor. The majority of PMRF's facilities and equipment are at the main base, which occupies a land area of 779 hectares (1,925 acres) and lies south of and adjacent to Polihale State Park. PMRF/Main Base is generally flat and approximately 0.8 kilometers (0.5 miles) wide and 10.5 kilometers (6.5 miles) long with a nominal elevation of 4.6 meters (15 feet) above mean sea level, except for the target launch pad areas. (U.S. Department of the Navy, 1998)

In addition to the PMRF/Main Base, PMRF holds a restrictive easement on 854 hectares (2,110 acres) of land adjacent to the facility for safety purposes. PMRF support facilities on Kauai include Makaha Ridge (99.2 hectares [245 acres]), Kokee (9.3 hectares [22.9 acres]), Kamokala Magazines (30.2 hectares [74.5 acres]), and Port Allen (0.28 hectares [0.69 acres]). The nearest community, Kekaha, is about 13 kilometers (8 miles) south of PMRF. (U.S. Department of the Navy, 1998)

The resources at PMRF are incorporated by reference from the GMD ETR EIS (MDA, 2003a), the THAAD Pacific Flight Tests EA (MDA, 2002c), and PMRF Enhanced Capability EIS (U.S. Department of the Navy, 1998). Exhibit 3-7 shows where the detailed discussion for each resource area can be found.

Exhibit 3-7. Resource Area Descriptions of Affected Environment for PMRF

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	PMRF Enhanced Capability EIS
Airspace	Yes	PMRF Enhanced Capability EIS
Biological Resources	Yes	GMD ETR EIS
Cultural Resources	Yes	THAAD Pacific Flight Tests EA
Geology and Soils	Yes	THAAD Pacific Flight Tests EA
Hazardous Materials and Waste	Yes	GMD ETR EIS
Health and Safety	Yes	THAAD Pacific Flight Tests EA and GMD ETR EIS
Land Use	Yes	THAAD Pacific Flight Tests EA
Noise	Yes	PMRF Enhanced Capability EIS
Socioeconomics and Environmental Justice	Yes	GMD ETR EIS
Transportation and Infrastructure	Yes	THAAD Pacific Flight Tests EA
Visual Resources	Yes	PMRF Enhanced Capability EIS
Water Resources	Yes	THAAD Pacific Flight Tests EA

Brief descriptions of these resource areas are provided below.

3.5.1 Air Quality

The main air pollution sources on the land-based portions of the PMRF are diesel powered generators, aircraft, and rocket launches. PMRF was issued a Title V Covered Source Permit for five diesel generators, which covers all significant stationary emission sources on PMRF. Aircraft emissions and missile exhaust emissions are both considered mobile sources and are thus exempt from National or State permitting requirements.

The only sampling station on Kauai that monitors for PM_{10} is located in Lihue. The area around the Lihue PM_{10} sampling station is classified as being in attainment for both

National and State AAQC. However, the city of Lihue is 42 kilometers (26 miles) from PMRF and is on the southeast side of the island; thus, air quality measurements there may not be representative of air quality at PMRF.

3.5.2 Airspace

There are two airfields in the ROI, the PMRF/Main Base, and the Kekaha airstrip, which is approximately 4.8 kilometers (3 miles) to the southeast of PMRF and 3.2 kilometers (2 miles) northeast of Kekaha.

The special use airspace at the PMRF consists of Restricted Area R-3101, which lies immediately above PMRF/Main Base and to the west of Kauai, and R-3107, which lies over Kaula, a small uninhabited rocky islet 35 kilometers (19 nautical miles) southwest of Niihau. The special use airspace also includes Warning Areas W-188 north of Kauai and W-186 southwest of Kauai, all controlled by PMRF. Warning Areas W-189 and W-190 north of Oahu and W-187 surrounding Kaula are scheduled through the Fleet Area Control and Surveillance Facility.

The airspace outside the special use airspace identified above is essentially international airspace controlled by Honolulu and Oakland ARTCCs. Class D airspace surrounds the PMRF/Main Base airfield with a ceiling of 762 m (2,500 ft). It is surrounded to the north, south, and east by Class C airspace with a floor 213 m (700 ft) above the surface.

3.5.3 Biological Resources

The vegetation on PMRF/Main Base is composed of two principal habitat types, non-native ruderal vegetation and kiawe/koa haole scrub. Vegetation at Makaha Ridge is dominated by introduced non-native species. Forty species of birds have been identified at PMRF/Main Base, including non-native and migratory birds and species endemic to Hawaii. Exhibit 3-8 identifies the threatened and endangered species that could potentially be located in the ROI.

Exhibit 3-8. Threatened and Endangered Species Known or Expected to Occur at PMRF

Common Name	Scientific Name	State Status	Federal Status
Plant Species			
Dwarf iliau (Makaha Ridge)	*Wilkesia hobdyi*	E	E
Lau'ehu	*Panicum niihauense*	E	E
Ohai	*Sesbania tomentosa*	E	E
Animal Species			
Green sea turtle	*Chelonia mydas*	E	T
Hawaiian black-necked stilt	*Himantopus mexicanus knudseni*	E	E
Hawaiian common moorhen	*Gallinula chloropus sandvicensis*	E	E
Hawaiian (American) coot	*Fulica americana alai*	E	E
Hawaiian dark-rumped petrel	*Pterodroma phaeopygia sandwichnesis*	E	E
Hawiian duck	*Anas wyvilliana*	E	E
Hawaiian goose (ne ne) (Makaha Ridge)	*Neschen sandvincensis*	E	E
Hawaiian hoary bat	*Lasiurus cinereus semotus*	E	E
Hawaiian monk seal	*Monachus schauinslandi*	E	E
Hawksbill sea turtle	*Eretmochelys imbricate*	E	E
Leatherback sea turtle	*Dermochelys coriacea*	E	E
Loggerhead sea turtle	*Caretta caretta*	E	T
Newell's Townsend's shearwater	*Puffinus auricularis newelli*	E	T
Olive ridley sea turtle	*Lepidochelys oliveacea*	E	T
Whale, Blue	*Balaenoptea musculus*	E	E
Whale, Finback	*Balaenopter aphysalus*	E	E
Whale, Humpback	*Megaotera novaengliae*	E	E
Whale, Sei	*Balaenopter a borealis*	E	E
Whale, Sperm	*Physeter macrocephalus*	E	E

Source: MDA, 2003a
E=Endangered; T=Threatened.

There are several environmentally sensitive habitats in the ROI. Wetlands are associated with the Mana base pond, Kawaiele wildlife sanctuaries (a State Waterbird Refuge for Hawaii's four endangered waterbird species, created at Mana during a sand removal program), and agricultural drains (Nohili and Kawaiele ditches) within PMRF/Main Base. The Hawaiian Islands Humpback Whale National Marine Sanctuary was created by Congress in 1992, and a small portion of the sanctuary lies within the ROI. A submerged barrier reef, roughly 13 kilometers (8 miles) long, lies offshore of PMRF. Additionally, in February 2003, USFWS designated 177 acres of PMRF, Hawaii as critical habitat for a species of grass. (MDA, 2003a)

3.5.4 Cultural Resources

PMRF is located within an archaeologically and ethnographically sensitive region of Kauai known as Mana. The Nohili Dune area on the northern portion of PMRF has been specifically cited in recorded Hawaiian oral literature as a burial area and holds many archeological resources. Based on evidence provided by the number of burials along the PMRF coastline, the dune zone at the facility has the potential to contain significant cultural resources throughout its north to south extension on the base.

Inland from the dune area, archaeological evidence indicates the presence of distinct cultural resources. The potential exists for the presence of other similar small, unmarked plantation period cemeteries in the interior area of PMRF. The two zones, which constitute the coastal portion of the installations property, contain distinct cultural resources, and both zones should be considered as archaeologically sensitive areas. (Department of the Navy, 1998)

Thirty-nine historic period resources were identified at PMRF; 35 of these are associated with World War II base construction. Four resources date from the late 19th or early 20th centuries. These include the Kawaiele Drain, a Japanese cemetery, another set of unmarked historic burials, and the Waterfront Operations Building used by PMRF at Port Allen. These 4 resources and another 16 World War II structures are potentially eligible for the National Register. Within the ROI, all of the traditional cultural materials identified to date have been associated with native Hawaiians; however, a Japanese cemetery and other historical burials are located within the boundary of PMRF. The Nohili Dune has been determined to be a site eligible for the National Register as a traditional cultural property. (Department of the Navy, 1998)

3.5.5 Geology and Soils

PMRF/Main Base’s boundaries lies within a low-lying coastal terrace called the Mana Plain. The plain covers the western flank of the island forming gentle westerly slopes ranging from about 2 percent near the volcanic uplands, to relatively flat over the coastal margins and shorelines occupied by PMRF. (MDA, 2002c)

A soil survey revealed the Mana Plain area contains some alluvium lagoon deposits, calcareous beach, and dune sands. The dominant soil within the PMRF area has been mapped as Jaucas loamy fine sand, 0 to 8 percent slopes. Active sand dunes and beaches exist along the ocean margins of PMRF. Dune lands consist of hills and ridges of sand drifted and piled by the wind. (MDA, 2002c)

3.5.6 Hazardous Materials and Waste

PMRF manages hazardous materials through the U.S. Navy's Consolidated Hazardous Materials Reutilization and Inventory Management Program (CHRIMP). CHRIMP mandates procedures to control, track, and reduce the variety and quantities of hazardous materials in use at facilities. Hazardous materials on PMRF are managed by the operations and maintenance contractor through CHRIMP. Hazardous materials managed through the CHRIMP program other than fuels are stored in Building 338. Typical materials used on PMRF/Main Base and stored at Building 338 include cleaning agents, solvents, and lubricating oils. (MDA, 2003a)

PMRF has management plans for oil and hazardous materials outlined in the *PMRF SPCC Plan* and the *Installation Spill Contingency Plan,* both of which also regulate tenant organizations and PMRF associated sites. (MDA, 2003a) PMRF/Main Base is a large-quantity hazardous waste generator with an EPA number. Hazardous waste on PMRF is not stored beyond the 90-day collection period. PMRF/Main Base has two accumulation points on base for hazardous wastes, Building 392 and Building 419. Building 392 accumulates all base waste except for otto (torpedo) fuel, a liquid monopropellant. Building 419 is the torpedo repair shop. At present, both buildings are not used at their maximum hazardous waste storage capacity. PMRF/Main Base has nine 189,270-liter (50,000-gallon) USTs and 10 smaller USTs containing petroleum products. Each UST is equipped with a vapor detection system.

3.5.7 Health and Safety

Range Control is in charge of surveillance, clearance, and real-time range safety. Range Safety Approval and Range Safety Operation Plan documents are required for all weapons systems using PMRF. Before an operation is allowed to proceed, the range is determined cleared using input from ship sensors, visual surveillance from aircraft and range safety boats, radar data, and acoustic information. PMRF conducts missile flight safety. Additionally, the Range Safety Approval and the Range Safety Operation Plan documents are required for all weapons systems using PMRF. (MDA, 2003a)

To ensure the protection of all persons and property, safety procedures have been established and implemented for the Ground Hazard Areas. Additionally, any program using a new type of ordnance device for which proven safety procedures have not been established requires an Explosive Safety Approval before the ordnance is allowed on PMRF or used on a test range.

3.5.8 Land Use

The combined efforts of state, county, and PMRF's Master Plan regulate land use within the boundaries of PMRF. The State of Hawaii Land Use Law classifies all lands into one of four categories: urban, rural, agricultural, or conservation. According to this classification, PMRF/Main Base is located within a conservation district. Conservation districts are managed by the Hawaii Department of Land and Natural Resources. PMRF is surrounded by Polihale State Park to the north, a landfill to the south, and the Pacific Ocean to the west. At present, no land use conflicts with the surrounding land exist. (MDA, 2002c) The prevailing land use on PMRF, in terms of area, is the explosive safety and airfield clear zones, which cover 39 percent of the base.

PMRF has severely restricted public access since September 2001 for security reasons. Coast Guard Regulation 33 CFR 165.1406 established a safety zone offshore from the facility. Entry into the current safety zone is prohibited at all times to prevent the interference with submerged cables. Special permission for transit through the area is obtained on an individual basis by prior arrangement with the local Captain of the Port or U.S. Coast Guard District Commander, who controls entry and exit.

3.5.9 Noise

Current sources of noise on PMRF/Main Base include airfield operations (high-performance aircraft, cargo/passenger aircraft, helicopter operations), base operations (including exercise support), and missile, rocket, and drone launches. Base operations that may impact the sound environment include, but are not limited to, power generation, exercise support, maintenance operations, and construction or renovation. The activity with the most noticeable sound events is the launch of missiles, rockets, and drones. These launch operations result in high-intensity, short-duration sound events, and past launches have resulted in no public noise complaints. The nearest on-base housing area is located approximately 8 km (5 mi) south of the Kauai Test Facility, 1.6 km (1 mi) from the southern launch sites. The nearest off-base residential area is Kekaha, which is approximately 13 km (8 mi) south of the northern launch areas and 3.2 km (2 mi) from the southern launch sites. (U.S. Department of the Navy, 1998) The residential areas and schools in Kekaha are the only sensitive receptors in the PMRF noise ROI.

3.5.10 Socioeconomics and Environmental Justice

Kauai is the fourth-largest Hawaiian island, covering 1,424 square kilometers (550 square miles), and northernmost in the chain. Kauai is the least populous of the major Hawaiian Islands, with a population numbering 58,463 people as of 2000. (Census Bureau, 2000) In 2000, the Bureau of the Census reported that the per capita income in Kauai County was slightly lower (4.7 percent) than the average per capita income of the state. Retail and service industries dominate the employment profile, employing more than 60 percent of the workforce at the county level. Currently, the three largest employers on Kauai are the County of Kauai, PMRF, and Wilcox Health Systems. PRMF is the largest Federal government employer on Kauai, and its workforce is composed of 183 DoD civilian personnel, 107 military personnel, 477 contractor personnel, and 103 tenants. Census data show the county population as 70.5 percent minority (non-white), with the largest minority group identifying as Asian (36.0 percent). (MDA, 2003a)

3.5.11 Transportation and Infrastructure

Imiloa Road is a two-lane roadway that provides direct access to PMRF from State Highway 50 (Kaumualii Highway). It intersects Kaumualii Highway, which is a primary circulation route connecting PMRF with Kekaha and Lihue. Kaumualii Highway, in the vicinity of Imiloa Road, is a two-lane road with a posted speed limit of 80 kilometers (50 miles) per hour.

3.5.12 Visual Resources

The physical setting of the area is coastal plain (Mana Plain), coastal dunes, and cliffs. The majority of the terrain within this area is relatively flat, except for the coastal dunes found in Polihale State Park and PMRF and the cliffs along the eastern boundary. Given the flat topography of the Mana Plain, prominent vistas and overlooks and views of the ocean are limited. The most visible landscape features are the cliffs on the eastern side of the Mana Plain and the Nohili Dunes on northern PMRF.

PMRF is bordered by Polihale State Park to the north, by sugar cane fields on the east, the county landfill to the south, and by the Pacific Ocean on the west. Besides the dunes in northern PMRF, the remainder of the base is relatively flat and consists mostly of non-native vegetation or a man-made environment of roads, mission-related buildings, and fences. Most of PMRF is effectively screened from public view by vegetation along the eastern and southern boundaries and by the sand dunes to the north. However, PMRF facilities can be viewed by the public from State Highway 50 (Polihale State Park access) if there is no developed sugar cane in the fields adjacent to the base. Facilities on PMRF do not obstruct any public views of the cliffs on the eastern side on the Mana Plain or the Nohili Dunes.

3.5.13 Water Resources

Three geological formations (bedrock, alluvium, and sand dunes) make up hydraulically connected aquifers within the ROI. The dune sand aquifer on which PMRF/Main Base lies consists of brackish ground water that floats on seawater recharged by rainfall and by seepage from the underlying sediments. This water is too brackish for plants and animals to consume and consequently is not used. Because the area’s ground water typically increases in salinity closer to the coast, potable sources are generally found along the base of cliffs. The nearest fresh ground water sources are in the Napali formation at the inland edge of the coastal plain along the base of the Mana Cliffs. (MDA, 2002)

At PMRF, potable water comes from the Kauai Department of Water and the State Department of Land and Natural Resources. Kauai Board of Water Supply water comes from high-level water tunnels above the Mana Plain and serves the southern portions of the base. The Mana well, approximately 305 meters (1,000 feet) south of the Kamokala Ridge magazine, serves the central and northern portions of the base.

3.6 United States Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site

USAKA/RTS is located in the Republic of the Marshall Islands (RMI), approximately 3,889 kilometers (2,100 nautical miles) southwest of Honolulu, Hawaii. USAKA/RTS is a crescent-shaped coral reef atoll comprised of approximately 100 islands that enclose the world's largest lagoon, 2,849 square kilometers (1,100 square miles). Although Kwajalein is the world's largest coral atoll, the combined land area of the islands totals only 14.5 square kilometers (5.6 square miles). Lagoon depths are typically 37 to 55 meters (120 to 180 feet), although numerous coral heads approach or break the surface. Ocean depths outside the lagoon descend rapidly to as much as 3,962 meters (13,000 feet) within 8 kilometers (5 miles) of the atoll. (SSDC, 1993) The three largest islands account for nearly one-half of the total land area and have significant construction on them. The FTF would only use Kwajalein Island for transport and temporary storage and Meck Island for pre-launch, launch and post-launch activities.

Data for some of the resources at USAKA are incorporated by reference from the Final Supplemental EIS for Proposed Actions at USAKA [USAKA SEIS, (SSDC, 1993)], the USAKA Temporary ETR EA [USAKA EA, (SSDC, 1995a)], the THAAD Pacific Test Flights EA (MDA, 2002c), the GMD ETR EIS (MDA, 2003a), and Mobile Sensors EA (MDA, 2005). Exhibit 3-9 shows where the discussion for each resource area can be found.

Exhibit 3-9. Resource Area Descriptions of Affected Environment for USAKA/RTS

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	THAAD Pacific Test Flights EA, USAKA SEIS
Airspace	Yes	GMD ETR EIS
Biological Resources	Yes	Mobile Sensors EA
Cultural Resources	Yes	USAKA EA
Geology and Soils	Yes	USAKA EA
Hazardous Materials and Waste	Yes	GMD ETR EIS
Health and Safety	Yes	GMD ETR EIS
Land Use	Yes	USAKA EA
Noise	Yes	USAKA SEIS
Socioeconomics and Environmental Justice	Yes	Mobile Sensors EA
Transportation and Infrastructure	Yes	Mobile Sensors EA
Visual Resources	Yes	USAKA SEIS
Water Resources	Yes	USAKA EA, GMD ETR EIS

Brief descriptions of these resource areas are provided below.

3.6.1 Air Quality

Air quality at USAKA/RTS is regulated by the Environmental Standards and Procedures for the U.S. Army Kwajalein Atoll Activities in the Republic of the Marshall Islands (UES), Part 3-1. The standards are designed to maintain the current air quality at RTS. Ambient air concentrations for criteria pollutants are not allowed to increase above the baseline level by more than an increment of 25 percent of the U.S. Ambient Air Quality Standards for the criteria pollutant. Additionally, the UES states that in no case shall ambient air quality concentrations for a criteria pollutant be allowed to exceed 80 percent of any U.S. Ambient Air Quality Standard. All significant stationary sources of criteria pollutants, hazardous air pollutants and activities covered by a U.S. National Emission Standard for Hazardous Air Pollutants must be governed by a Document of Environmental Protection (DEP), which is subject to review by U.S. and RMI agencies as well as public review.

Because of the relatively small numbers and types of air pollution sources, the dispersion caused by trade winds, and the lack of topographic features that inhibit dispersion, air quality at RTS is considered good (i.e., well below the maximum pollution levels established for air quality in the U.S.). The ambient air on Kwajalein was analyzed in a

U.S. Army Environmental Hygiene Agency study completed in 1993. The concentrations of SO_2, Pb, and PM_{10} were found to be below the NAAQS. Since there is no short-term NAAQS for NO_2, the study compared the measured concentrations at Kwajalein to the 1-hour California AAQS for NO_2; the concentrations at Kwajalein were below this standard. The concentrations measured at Kwajalein were below the 1-hour NAAQS for CO, but downwind concentrations were greater than the 8-hour NAAQS for CO. The existing primary pollution sources include power plants (1A and 1B), fuel storage tanks, solid waste incinerators, diesel fired commercial boilers, a concrete batching plant, and transportation. (MDA, 2002c)

The USAKA Supplemental EIS predicts that Kwajalein Island has far more air pollutant emissions than Meck Island. Existing pollution sources for Meck are similar to those listed for Kwajalein, including a power plant, a solid waste incinerator, fuel storage tanks, and transportation. Infrequent rocket launches also occur on Meck. (SSDC, 1993)

3.6.2 Airspace

RTS is located in international airspace, and air traffic is managed by the Oakland ARTCC at its Oceanic Control-6 Sector. There is no special use airspace in the ROI. (MDA, 2003a)

3.6.3 Biological Resources

Regulations governing endangered species and wildlife resources at RTS are specified in UES Part 3-4. Water quality and reef protection standards at RTS are in UES Part 3-2.

The types of vegetation currently found on USAKA/RTS consist of managed vegetation, herbaceous (green, leaf-like) strand, littoral (relating to the shore) shrubland, littoral forest, and coconut plantation. (MDA, 2003a) A 1988 study of the flora of several USAKA/RTS islands found a low species diversity common to coral atolls. (SSDC, 1995a) Only 17 percent of the species found are considered native to the Marshall Islands, and none are endemic.

No rare, threatened, endangered, or candidate plant species have been identified on RTS. (SSDC, 1995a and MDA, 2003a) No rare, threatened, endangered, or candidate avian or terrestrial species were identified on any of the islands of Kwajalein Atoll. (SSDC, 1995a and SSDC, 1989) Sea turtles frequently enter the lagoon and are commonly seen in the harbors at Kwajalein and the waters surrounding Meck Island. Green and hawksbill sea turtles have been observed on Kwajalein, but very little sea turtle nesting activity has been documented in recent years. Although some sandy beaches on the lagoon side of Meck provide potential sea turtle nesting habitat, no evidence of nesting has been observed. (GMD ETR EIS, 2003) Exhibit 3-10 presents threatened and endangered species known or expected to occur at USAKA.

Exhibit 3-10. Threatened and Endangered Species Known or Expected to Occur at USAKA

Common Name	Scientific Name	Federal Status
Dugong	*Dugong dugon*	E
Green sea turtle	*Chelonia mydas*	T
Hawksbill sea turtle	*Eretmochelys imbricate*	E
Leatherback sea turtle	*Dermochelys coriacea*	E
Loggerhead sea turtle	*Caretta caretta*	T
Olive ridley sea turtle	*Lepidochelys oliveacea*	T
Whale, Blue	*Balaenoptea musculus*	E
Whale, Finback	*Balaenopter aphysalus*	E
Whale, Humpback	*Megaotera novaengliae*	E
Whale, Sperm	*Physeter macrocephalus*	E

E=Endangered; T=Threatened
Source: SMDC and EPA, 2006

3.6.4 Cultural Resources

For USAKA/RTS, the Republic of the Marshall Islands (RMI) Historic Preservation Officer exercises the function of the State Historic Preservation Officer in accordance with the National Historic Preservation Act.

Portions of Kwajalein have been used continuously since World War II by the U.S. Military. There are no National Natural Landmarks or paleontological resources on USAKA. The Kwajalein Island Battlefield and the Roi-Namur Battlefield have been designated as National Historic Landmarks and are listed on the RMI National Register. No prehistoric archaeological sites have been identified; however, the presence of intact sites in original island areas cannot be entirely ruled out.

Traditional resources within the ROI are expected to be associated with the Marshallese culture; however, because of lengthy occupations of the Marshall Islands, German or Japanese traditional sites could also be present. Although a comprehensive survey and inventory of traditional cultural properties have not as yet been undertaken, such sites are known to occur in the Marshall Islands, some of which have been identified on Arno and Majuro Atolls. (SSDC, 1993)

Meck Island has been disturbed by construction and operational activities. Cultural resource surveys and testing conducted in 1988 and 1994 by Panamerican Consultants, Inc. identified no prehistoric or historic properties. (SSDC, 1995a)

3.6.5 Geology and Soils

The reefs and islands of RMI consist entirely of the remains of coral reef rock and sediments to a thickness of several thousand meters atop submarine volcanoes that formed 70 to 80 million years ago. As the volcanoes began to subside, living coral reefs grew upward to remain close to the surface and formed atolls. The reef rock is formed entirely from the remains of marine organisms (reef corals, coralline algae, mollusks, echinoderms, foraminiferans, and green sand-producing algae) that secrete external skeletons of calcium and magnesium carbonates. Only the upper thin veneer of the reef structure is alive and growing.

The soils of USAKA have poor fertility and are deficient in three major constituents: nitrogen, potash, and phosphorus. The generally low fertility of the atoll soils is due to coarse soil particles, low organic matter content, and alkaline soils. Thereby, plant growth is severely inhibited. (SSDC, 1995a)

3.6.6 Hazardous Materials and Waste

The use of hazardous materials at RTS, including Meck Island, is limited primarily to materials used in facility infrastructure support and flight operations, with some additional quantities of hazardous materials used by various test operations at the range. Hazardous materials used in base infrastructure support activities include various cleaning solvents (chlorinated and non-chlorinated), paints, cleaning fluids, pesticides, motor fuels and other petroleum products, Freon (for air conditioning), and other materials.

All materials imported or introduced into the RMI for use by USAKA operations are identified and classified through a central system. Employees who handle or otherwise deal with hazardous substances and waste receive specialized training. Fuels are stored in ASTs located at several islands in the USAKA. Fuels are transported to RTS by ship. As described in the UES Part 3-6.4.3, a Hazardous Materials Procedure must be submitted to the USAKA Commander for all imports of hazardous materials within 15 days of receipt of the material, or before use; whichever occurs first..

Significant quantities of waste fuels are not normally generated since fuels are used up in power generation, flight operations, marine vessels, and vehicle and equipment usage. Elementary pre-treatment of hazardous waste discharge is permitted prior to entry into the wastewater treatment plant. Otherwise, hazardous or toxic waste treatment or disposal is not allowed at RTS under the UES. Hazardous waste, whether generated by RTS activities or range users, is handled in accordance with the procedures specified in the UES Part 3-6.5.

The UES Part 3-6.4.1 provides guidelines for the preparation and implementation of a Kwajalein Environmental Emergency Plan for responding to releases of oil, hazardous materials, pollutants, and contaminants to the environment. The Kwajalein Environmental Emergency Plan is a contingency plan similar to a spill prevention, control and countermeasure plan, but which incorporates response provisions of a National Contingency Plan. The UES Part 3-6.4.2 requires the preparation of a Hazardous Materials Management Plan to address USAKA's import, use, handling, and disposal of hazardous materials. The hazardous materials management plan is incorporated into the Kwajalein Environmental Emergency Plan.

3.6.7 Health and Safety

Range safety is accomplished by compliance with RTS regulations and use of established procedures and safety precautions to prevent injury to people and minimize damage to property. The ground safety plans for programs at RTS contain emergency procedures for response to potential accident scenarios. Fire protection is provided by fire suppression systems in most operations buildings and by continuously staffed fire stations on Kwajalein, Roi-Namur, and Meck Islands. Flight safety activities include the preparation of a flight safety plan that includes evaluating risks to inhabitants and property near the flight, calculating trajectory and debris areas and specifying range clearance and notification procedures. Flight safety plans are developed for both launch missions and incoming reentry vehicles.

Potential radar exposure is minimized by operating RTS radars are at a minimum inclination of 2 degrees above horizontal, which allows a hazard free zone from ground surface to at least 5 meters (15 feet). Electromagnetic radiation hazard zones provide a safety factor 10 times greater than the Institute of Electrical and Electronics Engineers Maximum Permissible Exposure Limit.

3.6.8 Land Use

Kwajalein is the headquarters of USAKA and has a land area of 303 hectares (748 acres). It is extensively developed with housing and community facilities toward the northern end of the island; air operations, supply, and utilities near the center of the island; and research, development, and communications operations toward the western end of the island. The land uses on the island include flight operations, family housing, research and development operations, communications operations, supply (which includes high explosives magazine, petroleum, oils, and lubricants, and disposal), community support and unaccompanied personnel housing, outdoor recreation, utilities, maintenance, sanitary landfill, waterfront operations, and administration.

Meck Island has a land area of approximately 22 hectares (55 acres). Facilities related to power generation, maintenance and supply, waterfront and air operations, and limited community support are located on the southern half of the island. The rest of the island is used for research and development operations that include missile launch complexes. (SSDC, 1995a)

3.6.9 Noise

Primary sources of noise on Kwajalein include aircraft, power plants, marine sandblasting and service, air conditioning units, and small diesel engine generators. Noise-sensitive receptors, such as family housing and schools, exist at various locations on Kwajalein.

The primary noise sources on Meck Island are generators, helicopter operations, and air conditioning units. Missiles have been launched infrequently from Meck Island. Since the island was developed as a launch support facility and has no inhabitants occupied in unrelated activities, no noise-sensitive receptors have been identified on the island. The nearest inhabited island to Meck Island is Gugeegue Island, which is approximately 26 kilometers (16 miles) away. (SSDC, 1993)

3.6.10 Socioeconomics and Environmental Justice

USAKA is part of the RMI, which has a population of about 57,738 people over 100 islands. USAKA strictly regulates access to Kwajalein Island, thereby controlling its resident population. The nonindigenous population of Kwajalein Island fluctuates depending on program activity, but is approximately 1,800. This number consists of military, civil service, and contractor personnel and their dependents. Precise data concerning the total income earned by USAKA nonindigenous personnel are not available.

3.6.11 Transportation and Infrastructure

There are approximately 21 kilometers (13 miles) of paved roads and 11 kilometers (6.5 miles) of unpaved roads on Kwajalein Island. Bicycles are the principal means of transportation and travel on the same paths used by pedestrians, as well as on roads used by motor vehicles. Island shuttle buses provide vehicular transportation to and from work and school.

Marine transport facilities are concentrated at Kwajalein Island, which serves as a base for receiving cargo and fuel to USAKA/RTS. Kwajalein Island also has air transportation capabilities and houses the Bucholz AAF, which serves as a refueling point for a wide variety of military and civilian aircraft.

Meck Island has about 2 kilometers (1 mile) of paved road. Meck Island has a concrete pier that accepts both personnel and cargo. Meck Island has a runway that no longer accepts fixed-wing aircraft but is capable of accepting helicopters. (MDA, 2005)

3.6.12 Visual Resources

The USAKA islands have a long history of human occupation and modification. A significant portion of the USAKA islands has been altered or replaced by structures. On Kwajalein and Meck Islands, man-made structures and features dominate. (SSDC, 1993)

3.6.13 Water Resources

Regulations addressing drinking water quality can be found in UES Part 3-3.5. Drinking water is produced to meet the standards of the UES. Kwajalein has a conventional package filter drinking water system for potable (drinkable) water production. Under normal conditions, Kwajalein's potable water system can provide an adequate supply of fresh water. Raw water is provided primarily by a rainwater catchment system along the runway. During dry seasons, additional water is provided by pumping the freshwater lens that forms an unconfined surficial aquifer beneath the island surface. Portable reverse osmosis water-purifying units are employed to remove organic contaminants from the lens well water.

Meck Island is surrounded by Class A and B Coastal water. (SMDC and EPA, 2006) The source of potable water on Meck Island is a rainwater catchment. Two tanks store raw freshwater that is filtered and chlorinated before being pumped to the system. No treated water storage is provided. (MDA, 2002c)

3.7 Wake Island

Wake Atoll is a typical Pacific coral atoll consisting of three islands, Wake, Wilkes, and Peale. The v-shaped atoll is approximately 14.5 kilometers (9 miles) long from the tip of Wilkes Island around to the tip of Peale Island and 3 kilometers (2 miles) wide from approximately Heel Point to the south portion of Wake Island. Total landmass is approximately 739 hectares (1,826 acres). (SSDC, 1994b)

Wake Island is a U.S. possession and under the control of the U.S. Air Force. It was a U.S. Army launch support facility operated under a caretaker permit from the Air Force until October 2002 when the Air Force resumed administration. The MDA continues to operate the Wake Island Launch Center (WILC) as a tenant organization. RTS maintains and operates the launch facilities and also provides instrumentation, communications, flight and ground safety, security, and other support. The island has a population of roughly 100 people and supports a 3,000-meter (9,850-foot) long and 46-meter (150-foot) wide runway, as well as two missile launch pads. Wake Island was designated a National Historic Landmark in 1985 to preserve both the battlefield where important World War II events occurred and Japanese and American structures from that period. (MDA, 2002c)

The resources for Wake Island are incorporated by reference from the Wake Island EA (SSDC, 1994b), the Wake Island Supplemental EA (MDA, 2007b), the WILC

Supplemental EA (SMDC, 1999), the THAAD Pacific Test Flights EA (MDA, 2002c), and the Mobile Sensors EA (MDA, 2005). Exhibit 3-11 shows where the discussion for each resource area can be found.

Exhibit 3-11. Resource Area Descriptions of Affected Environment for Wake Island

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	Wake Island Supplemental EA, WILC Supplemental EA
Airspace	Yes	THAAD Pacific Flight Tests EA, WILC Supplemental EA
Biological Resources	Yes	Wake Island Supplemental EA
Cultural Resources	Yes	Wake Island Supplemental EA
Geology and Soils	Yes	WILC Supplemental EA
Hazardous Materials and Waste	Yes	THAAD Pacific Flight Tests, WILC Supplemental EA, Wake Island Supplemental EA
Health and Safety	Yes	Wake Island Supplemental EA
Land Use	Yes	THAAD Pacific Flight Tests EA
Noise	Yes	Wake Island Supplemental EA
Socioeconomics and Environmental Justice	Yes	THAAD Pacific Flight Tests EA, Wake Island Supplemental EA
Transportation and Infrastructure	Yes	THAAD Pacific Flight Tests EA, Wake Island Supplemental EA
Visual Resources	Yes	Mobile Sensors EA
Water Resources	Yes	WILC Supplemental EA, THAAD Pacific Flight Tests EA

Brief descriptions of these resource areas are provided below.

3.7.1 Air Quality

The Wake Atoll is within the jurisdiction of USEPA Region 9. There is no ambient air quality monitoring data for Wake Atoll, and there are no evident air pollution problems because the strong trade winds quickly disperse any local emissions. Furthermore, because there are no other islands within several hundred miles of Wake Atoll, there are no nearby sources from which Wake Atoll would receive air pollutants, and there are no nearby communities that could be affected by air pollutants from emissions generated at Wake Atoll. The principal pollutant emission sources are the power plant, motor vehicles, aircraft operations, fuel storage tanks, open burning of trash at the base landfill, incinerator emissions, and infrequent rocket launches. None of the emission sources at Wake Atoll meet the threshold for Title V permitting under the CAA, and no AAQS have been exceeded. (MDA, 2002c)

3.7.2 Airspace

Wake Island is located below international airspace that is managed by the Oakland ARTCC Oceanic Control-5 Sector.

3.7.3 Biological Resources

The Wake Atoll is a biologically diverse group of islands that includes insects, arthropods, small mammals, marine mammals, over 30 species of birds and over 200 species of plants. Coral reefs off the coast of Wake Island are protected under Executive Order 13089, Coral Reef Protection. Marine mammals are protected under the Marine Mammal Protection Act of 1972 and may occur in the open ocean area surrounding Wake Atoll and between Wake and Kwajalein Atolls. Exhibit 3-12 presents federally listed threatened and endangered species with potential to occur at Wake Island are identified below. Other Federally protected terrestrial biota at Wake Atoll include migratory seabirds, shorebirds, and occasional vagrant water birds. These birds are identified as "migratory" and are protected under the Migratory Bird Treaty Act of 1916 (16 U.S.C. 703-712).

Exhibit 3-12. Threatened and Endangered Species Known or Expected to Occur at Wake Island

Common Name	Scientific Name	Federal Status
Animal Species		
Crow, Mariana; Aga	*Corvus kubaryi*	E/CH
Green sea turtle	*Chelonia mydas*	T
Hawksbill sea turtle	*Eretmochelys imbricate*	E
Kingfisher, Micronesian; Siheik	*Halcyon cinnamomina cinnamomina*	E/CH
Leatherback sea turtle	*Dermochelys coriacea*	E
Loggerhead sea turtle	*Caretta caretta*	T
Moorhen, Mariana; Pulattat	*Gallinula chloropus guami*	E
Swiftlet, Guam; Yayaguak	*Collecalia bartschi*	E
Warbler, nightingale reed; Gaga karisu	*Acrocephalus luscinia*	E

E= Endangered; T= Threatened; CH= Critical Habitat Designated
Source: MDA, 2007b

3.7.4 Cultural Resources

No evidence of prehistoric cultural resources has been discovered on Wake Island. Wake Island in its entirety was designated a National Historic Landmark in 1985 to preserve both the battlefield where important WWII events occurred and Japanese and American structures from that period. A comprehensive survey of Japanese earthen structures and field fortifications has not been conducted. No unique paleontological or traditional use resources are known to exist on the island.

3.7.5 Geology and Soils

Wake Island is typical of mid-Pacific Ocean atolls formed when a volcano rises (seamount) above the sea surface and then subsides back below the surface due to deflation of the underlying magma chamber. The maximum elevation on Wake Island is 6 meters (21 feet) above mean sea level, and the average elevation is likely only about 3 meters (10 feet). This makes the island very susceptible to damage from high waves generated by tropical storms and high winds. Wake Island soils are predominantly coarse-grained and almost exclusively composed of calcium carbonate. Therefore, they are of low fertility, lacking many of the nutrients required to support many plant species.

3.7.6 Hazardous Materials and Waste

Operations using hazardous materials at Wake Island are limited to aircraft flight and maintenance activities, base operations and infrastructure support activities, and infrequent missile launches. JP-5 jet fuel is the hazardous material used in the greatest quantity at Wake Island. Storage of up to 37.8 million liters (10 million gallons) of JP-5 can be accommodated in fuel storage areas. No waste JP-5 is produced under normal conditions. The balance is consumed by aircraft flight operations and power production. In the event of a JP-5 spill, existing spill control contingency plans would be implemented to minimize the area of potential contamination and to expedite cleanup.

The USEPA identified Wake Island Airfield as a “large quantity generator” of hazardous waste in 1994. However, the installation could qualify for “small quantity generator” status based on actual amounts of hazardous wastes generated since 1994. Types of wastes generated include small quantities of used solvents, paints, cleaning fluids, asbestos-containing materials (generated during building maintenance activities) and pesticides. Hazardous waste shipments are normally consigned to the Wake Island supply barge for shipment to Hawaii. (MDA, 2002c)

3.7.7 Health and Safety

The primary existing hazards at Wake Island are associated with aircraft refueling and base infrastructure support. Typical hazards include the handling and use of hazardous materials, exposure to noise from aircraft operations, and physical safety associated with the use of heavy equipment and support operations. These hazards are managed and controlled through implementation of safety programs, procedures, and the use of safety equipment. (MDA, 2007b)

The USAKA controls all range operations and all procedures are conducted in accordance with the USAKA Range Safety Manual and USAKA policies and procedures. In the event of a catastrophic event (e.g., natural disaster, hazardous materials spill, aircraft or missile mishap), Operations Plan 355-1, Wake Island Disaster Preparedness Plan, would be implemented.

3.7.8 Land Use

The MDA currently manages and operates a national test and range facility at Wake Island. U.S. Air Force assumed ownership of Wake in October 2002. Wake Island is the main island containing the majority of the AB's operations and facilities. Housing and community facilities are located toward the northern end of the island. The central portion of the island contains support facilities. An aircraft runway is located on the southern portion of the island supplying additional support for current operations. (MDA, 2002c)

The Missile Launch Facilities occupied by MDA comprise 73 hectares (180 acres) on Wake Island south of the airfield and west of Peacock Point. The missile launch operations area is in a good location, well removed from most incompatible land uses and adjacent to the operational land uses that support it. Launches at Wake Island would occur from Pad 2, located near the southern shoreline.

3.7.9 Noise

Wind and surf contribute to relatively high natural background sound levels on Wake Island. These background levels can mask the approach of vehicles and personnel are not always aware of aircraft landings. Anthropogenic sources of noise at Wake Island are from airfield operations and base maintenance activities. Infrequent missile launches are another noise source on Wake Island. Launch vehicles generate impulse-type noise for a brief period during launch and only a few launches could occur per year. (MDA, 2007b)

Personnel engaged in missile launch operations work safely inside reinforced concrete shelters and do not require hearing protection. Other island personnel are evacuated beyond the LHA, where they do not require hearing protection. With the exception of diesel generators, other sources of noise do not exist on the island. (MDA, 2007b)

3.7.10 Socioeconomics and Environmental Justice

The permanent island population is small and consists of approximately 100 people. This includes civilian contractor personnel. The number of non-permanent personnel fluctuates daily in relation to each mission. There are no private homes, motels/hotels, or private retail business on the island. The economy on the island is dominated by the military instillation. Government and contractor employment is the only contributor to the island economy.

3.7.11 Transportation and Infrastructure

Transportation on Wake Island is provided by bus or contractor or government-owned vehicles. The primary road is a two-lane paved road extending the length of Wake Island to the causeway between Wake Island and Wilkes Island. The causeway was rehabilitated in 2003 and is capable of supporting heavy equipment. A bridge connecting Wake and Peale Islands burned down in December 2002. A combination of paved and coral roads serves the marina area.

Wake Island's runway is approximately 3,000 meters (9,850 feet) long and 46 meters (150 feet) wide, and is central to the missile launch support missions. Wake Island is supplied by sea-going barges and ships. The civilian contractor maintains three small landing barges used to transfer material from ships to the dockyard.

3.7.12 Visual Resources

The objects that dominate the visual landscape are the buildings on the island and any support structures for the airfield and launch pads. Since the island is designated as a National Historic Landmark, it is considered to have high visual sensitivity.

3.7.13 Water Resources

The average annual precipitation on Wake Island is 89 cm (35 in). Due to the relatively small area of the island and the high permeability of the soil, all precipitation rapidly runs from the land into the ocean and fresh surface water on the island and lagoon or filters into the soil. Other than the water collected in the catchment basins, there is virtually no fresh surface water on the island. The primary source of potable water on Wake Island is desalinization of ground water. There are no sources of fresh ground water on the island.

3.8 White Sands Missile Range, New Mexico

WSMR is a DoD major range and test facility with headquarters located approximately 40 kilometers (25 miles) east of Las Cruces, New Mexico in Dona Ana County. WSMR covers approximately 8,288 square kilometers (3,200 square miles) in south-central New Mexico and is the largest, all-overland test range in the western hemisphere. The range itself, together with adjacent call-up areas, has diverse environmental attributes and resources. The primary mission of WSMR is the operation of a National Range in accordance with direction from the Army Test and Evaluation Command and DoD Directive 3200.11, *Major Range and Test Facility Base*. This mission includes range instrumentation research and development; developmental testing of U.S. Army, U.S. Navy, and U.S. Air Force air-to-air/surface, surface-to-air, and surface-to-surface weapons systems; dispense and bomb drop programs; gun system testing; target systems; meteorological and upper atmospheric probes; equipment, component, and subsystem programs; high-energy laser programs; and special tasks. WSMR also performs testing for industry and foreign countries. (MDA, 2002c)

The resources at WSMR are incorporated by reference from the WSMR Range-Wide EIS [WSMR EIS, (WSMR, 1998)], the WSMR New Mexico LPT EA [WSMR EA, (MDA, 2002a)], the ABL SEIS (MDA, 2003c), and the Use of Tributyl Phosphate in the Intercept Debris Measurement Program at WSMR EA [TBP IDMP EA, (MDA, 2004b)]. Exhibit 3-13 presents the documents incorporated by reference for each of the resource areas.

Exhibit 3-13. Resource Area Descriptions of Affected Environment for WSMR

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	TBP IDMP EA
Airspace	Yes	ABL SEIS
Biological Resources	Yes	Mobile Sensors EA
Cultural Resources	Yes	ABL SEIS
Geology and Soils	Yes	WSMR EA
Hazardous Materials and Waste	Yes	TBP IDMP EA
Health and Safety	Yes	TBP IDMP EA
Land Use	Yes	WSMR EA
Noise	Yes	WSMR EA
Socioeconomics/Environmental Justice	Yes	TBP IDMP EA
Transportation and Infrastructure	Yes	WSMR EA
Visual Resources	Yes	WSMR EIS
Water Resources	Yes	WSMR EA, TBP IDMP EA

Brief descriptions of these resource areas are provided below.

3.8.1 Air Quality

WSMR is located within Otero, Lincoln, Socorro, Sierra, and Doña Ana Counties. Dispersion areas to the east of WSMR could also include DeBaca, Eddy, and Chaves Counties. Otero, Socorro, Sierra, Lincoln, DeBaca, Eddy, and Chaves Counties are in attainment for all state and Federal standards. In Doña Ana County, the Sunland Park area was designated as marginally non-attainment for ozone in 1995, and the Anthony area was designated as marginally in nonattainment for PM-10 in 1991. In response to this exceedance, a Natural Events Action Plan was submitted to the EPA for reduction of PM-10 and a State Implementation Plan for ozone. As part of these plans, WSMR has signed a Memorandum of Agreement with the New Mexico Environment Department. (MDA, 2004b) WSMR currently operates under an approved Title V Air permit. Air pollution sources on the range include mobile sources such as exhaust from aircraft, helicopter, missiles, cars, and trucks, and non-mobile sources such as boilers, generators, paint booths, woodworking shops, sandblasting, and fuel storage and pumping facilities.

3.8.2 Airspace

With the exception of the special use airspace discussed below, the airspace in the ROI is a mix of controlled and uncontrolled airspace. The controlled airspace comprises Class A airspace from 18,000 feet above MSL up to and including FL 600 (60,000 feet), Class E airspace below 18,000 feet, and either Class C or Class D airspace surrounding airports within the Class E airspace. There is no Class B airspace within the WSMR ROI. Class G, or uncontrolled airspace, below 14,500 feet lies to the west and southwest of Socorro and Truth or Consequences below and surrounding the Cato, Reserve, and Morenci MOA. The WSMR airspace ROI lies within the Albuquerque ARTCC boundaries. (MDA, 2003c)

There are 22 Restricted Areas in the WSMR ROI associated with WSMR, Holloman AFB, or Fort Bliss. The controlling agency for the majority of Restricted Areas within the WSMR airspace ROI is Albuquerque ARTCC.

3.8.3 Biological Resources

WSMR is located in the northern Chihuahuan Desert and supports a diverse and complex mosaic of grasslands, shrublands, and woodlands. WSMR is characterized by several major physiographic features such as the Jornada del Muerto, the San Andres and Organ mountains, and the Tularosa Basin. More than 200 species of birds have been observed at WSMR, although less than half of the species are known as regular residents. Additionally, 79 mammalian species can be found at WSMR including coyote, desert bighorn sheep, and California bat. Exhibit 3-14 identifies threatened and endangered species located in the vicinity of WSMR. (MDA, 2005)

Exhibit 3-14. Threatened and Endangered Species in the Vicinity of WSMR

Common Name	Scientific Name	State Status	Federal Status
Plant Species			
Crested Coralroot	*Hexalectris spicata*	E	-
Sand Pricklypear	*Opuntia arenaria*	E	-
Mescalero milkwort	*Polygala rimulicola mescalerorum*	E	-
Night-blooming cereus	*Peniocereus greggii* var. *greggii*	E	SC
Organ Mountains foxtail cactus	*Escobaria organensis*	E	-
Sneed's pincushion cactus	*Escobaria sneedii* var. *sneedii*	E	E
Todsen's Pennyroyal	*Hedeoma todsenii*	E	E
Villard pincushion cactus	*Escobaria villardii*	E	SC
Animal Species			
American Peregrine falcon	*Falco peregrinus*	T	D
Aplomado falcon	*Falco femoralis*	E	E
Baird's sparrow	*Ammodramus bairdii*	T	SC
Bald eagle	*Haliaeetus leucocephalus*	T	D
Bell's vireo	*Vireo belli*	T	-[1]
Gray vireo	*Vireo vicinior*	T	-
Loggerhead shrikes	*Lanius ludovicianus*	-	E
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E
Varied bunting	*Passerind versicolor*	T	-
Western snowy plovers	*Charadrius alexandrinus nivosus*	-	T
White Sands pupfish	*Cyprinodon tularosa*	T	-

1 Listed as endangered for California sub-species only
SC = species of concern; E = endangered, T = threatened, D = delisted
Source: MDA, 2005; NMDGF, 2007; USDA, 2007; USFWS, 2007b

3.8.4 Cultural Resources

Numerous cultural resource surveys and identification efforts have been conducted at WSMR. These surveys have covered approximately 150,000 acres and have resulted in the identification of thousands of cultural resources. However, due to the large extent of the property that has never been surveyed (over 93 percent as of 1997) the total number of resources present is not known. The total number of sites is predicted to be approximately 27,000. There are a number of cultural resources of unknown eligibility, including approximately 6,000 prehistoric sites. There are three National Register listed properties within the WSMR boundaries: The Trinity sites, Launch Complex 33, and The

White Sands National Monument Historic District (also New Mexico state-registered). In addition to these sites, there are two New Mexico state-registered sites: the Mockingbird Gap site and the Parabolic Dune Hearth Mounds. (MDA, 2003c)

Traditional cultural properties are known to exist in the WSMR region, and Apache tribal leaders indicate that the Oscura Mountains (situated in the northern portion of the range) are used for traditional religious purposes. Salinas Peak, in the San Andres Mountains, is a sacred site for the Mescalero Apache. Within the WSMR boundary, numerous paleontological sites have been recorded (prehistoric mammal tracks). There are no National Natural Landmarks within WSMR.

3.8.5 Geology and Soils

WSMR is located within the Basin and Range geologic province. Down-dropped basins (such as the Tularosa Basin and Jornada del Muerto), mountain ranges, volcanic and clastic (sand, gravel, and clay) rocks which fill the basins, and normal faulting zones have resulted from extension in the crust. Mountain range rocks include Paleozoic- and Mesozoic-era (225 to 65 million years ago) sedimentary rocks and mid-Tertiary-aged igneous intrusive and volcanic rocks. Gypsum, ground water, and minerals are potential geologic resources found at WSMR.

Soils identified at WSMR include the gypsum dunes and lake bed deposits of the White Sands National Monument and Lake Lucero area, the rocky soils associated with the rough slopes and foothills of the neighboring mountains, and the sandy loams of the Tularosa Basin and the Jornada del Muerto. Soils are generally dry and susceptible to wind erosion. (MDA, 2002a)

3.8.6 Hazardous Materials and Waste

The WSMR Directorate of Public Works has primary responsibility for compiling and tracking hazardous materials information. Individual users of hazardous materials on WSMR are responsible for safe storage and handling of the materials they obtain. Hazardous materials used in support activities include various cleaning solvents, paints, cleaning fluids, pesticides, fuels, coolants, and other materials. Hazardous materials used in range tests include those listed above as well as explosives and propellants. The WSMR Installation Spill Contingency Plan establishes responsibility, outlines personnel duties, and provides resources and guidelines for use in the control, clean-up, and emergency response for spills. (MDA, 2004b)

3.8.7 Health and Safety

WSMR provides a Safety and Health program for all employees, and ensures that the public off base is advised of any potential hazards present at the facility. Any program involving missile flight safety must undergo a thorough safety review, a risk analysis, and preparation of Standard Operating Procedures (SOPs). Launch complexes and impact areas are located in remote areas of the base. The flight paths do not overfly the Main Post where the majority of WSMR personnel are located. WSMR has implemented a comprehensive safety program to identify, evaluate, and mitigate potential workplace hazards such as exposure to toxic materials used in ongoing operations and the handling and use of explosive and flammable materials.

3.8.8 Land Use

As a national test range, WSMR contains an extensive complex of launch sites, impact areas, instrumentation sites, facilities, and equipment. Missile launch sites are located throughout the range.

The Western Call-up area, located to the west of the range, and the Northern Call-up area, located to the north of the range, were established in 1960 in connection with critical military testing. A supplemental agreement with private landowners in the call-up area was established in 1963. This agreement allows a maximum of 20 evacuations per year for all WSMR activities. Land use in the Western Call-up area consists primarily of livestock grazing and recreation. The Northern Call-up area contains 357,721 hectares (883,916 acres) and is populated by approximately 160 people. The Call-up areas are temporarily evacuated for public safety, military security, and in some instances missile impact. Residents evacuated during tests are compensated for their time and inconvenience. (WSMR, 1998; MDA 2002a)

The WSMR boundaries encompass the White Sands National Monument, San Andres National Wildlife Refuge, and two National Historical Landmarks—Trinity Site and Launch Complex 33. Portions of Holloman AFB, Jornada Experimental Range, and the NASA White Sands Test Facility are located in co-use areas within WSMR. Agencies and organizations use the shared land for a variety of purposes, including conservation, recreation, research, and livestock production.

White Sands National Monument is used by the public as a recreation area. The primary mission of San Andres National Wildlife Refuge is to protect habitat for desert bighorn sheep, a state endangered species. Public use of the Refuge is restricted and must be coordinated with WSMR. Scientific research is conducted within the Refuge boundaries. The public is permitted access to the Trinity Site twice per year, in April and October.

3.8.9 Noise

In the vicinity of WSMR, U.S. Air Force flights, supersonic combat training, U.S. Army helicopter flights, missile launches, ordnance explosions, aircraft drone overflights, gun firing, general vehicle traffic, and low-altitude military jet traffic are the existing primary sources of noise. Currently, numerous missiles are launched from WSMR. Additionally, supersonic flight training occurs over most of WSMR. The noise environment for

WSMR has most recently and thoroughly been described in the *WSMR Range-Wide EIS.* (WSMR, 1998) Traffic, loudspeakers, and mechanical activities are the primary sources of noise except for the few seconds during the missile launch.

3.8.10 Socioeconomics and Environmental Justice

Population figures for 2000 indicate minority levels lower than 40 percent for all counties being considered (see Exhibit 3-15). The 1999 figures for poverty status indicate that persons below poverty level in all counties except Socorro County are comparable to the state average. Native American populations for these counties are relatively low in comparison with the state's 9.5 percent average. Socorro's population is highest, at 10.9 percent, but this only exceeds the New Mexico total by 1.4 percent. Sierra has the lowest population of the counties being considered, and the lowest percent of American Indians.

Exhibit 3-15. 2000 Census Demographic Data for WSMR

County	Population	White Persons	Minority Persons	American Indian/AK Native	Persons Below Poverty (1999)
Doña Ana	176,790	67.8%	32.2%	1.5%	25.4%
Lincoln	19,411	83.6%	16.4%	2.0%	14.9%
Otero	62,298	73.7%	26.3%	5.8%	19.3%
Sierra	13,270	87.0%	13.0%	1.5%	20.9%
Socorro	18,078	62.9%	37.1%	10.9%	31.7%
New Mexico (state)	1,819,046	66.8%	33.2%	9.5%	18.4%

Source: MDA, 2004b

3.8.11 Transportation and Infrastructure

U.S. Highway 70 is the only U.S.-designated highway in the ROI. U.S. Highway 70 provides Las Cruces and Alamogordo access to WSMR via Owens Road. WSMR has seven primary access points. U.S. Highway 70 provides direct access to the Small Missile Range gate and to Owens Road via the Las Cruces and El Paso gates.

WSMR's road network is extensive, but in a relatively poor condition. There are three classifications of the road types on WSMR: major roads, secondary roads, and trails. The major roads are two lane roads that are paved, graded, and maintained as funding permits. Approximately 966 kilometers (600 miles) of secondary roads serve the WSMR network. Secondary roads on WSMR are unpaved roads that are graded and maintained as funding permits. The WSMR road network has approximately 2,414 kilometers (1,500 miles) of bladed trails. These unpaved trails are bladed but not maintained on a regular basis.

3.8.12 Visual Resources

WSMR is located within an area of rich aesthetic and visual resources. The region is characterized by scenic landscapes and rugged topography, and the range itself offers some of the least spoiled natural viewscapes in the area. Natural resources of aesthetic value include the Organ Mountains, the San Andres Mountains, Los Pinos Mountains, WSNM, the Jomado del Muerto and Malpais lava beds, and numerous wildlife areas including both designated and undesignated natural areas of great beauty and scenic diversity. There are a number of areas of aesthetic concern within the ROI, including White Sands National Monument and Little Black Peak Wilderness Study Area. Additionally, there are two special management areas within the ROI: White Sands National Monument and Trinity Site.

3.8.13 Water Resources

WSMR is primarily located in the Tularosa and Jornado Water Basins. Perennial surface water on WSMR includes Mound Springs, Lake Lucero, Malpais Springs, Three Rivers, and Salt Creek. Numerous intermittent drainages and water bodies also occur on WSMR.

The water supply for WSMR is obtained almost exclusively from wells that tap valley-fill aquifers. Currently 11 wells from 4 adjacent watersheds serve the Main Post with the capacity of servicing 14,500 people. Most potable water occurs near the edge of the Tularosa Basin, where runoff from nearby mountains permeates through a landform deposit know as an alluvial fan. The majority of drinking water for the offsite areas comes from groundwater; however, Otero County has six surface water locations and Lincoln County has two surface water locations used as drinking water sources. (MDA, 2004b)

3.9 Fort Wingate, New Mexico

The Fort Wingate Army Depot (FWAD), is located in McKinley County in northwest New Mexico, 11 kilometers (7 miles) east of Gallup, and consists of approximately 8,800 hectares (22,000 acres). The facility, which was originally a munitions storage depot and a controlled firing area, is presently in caretaker status. WSMR is located 240 kilometers (150 miles) to the south. The regional climate is semiarid, characterized by spring and fall droughts. Summer precipitation accounts for approximately 60 percent of the annual precipitation of 28 centimeters (11 inches) per year. Fort Wingate is bounded on the west by the Hogback, a ridge of steeply dipping rocks; on the south by the Zuni Mountains; on the east by a small valley terminating at the base of the Zuni Mountains; and on the north by the south fork of the Puerco River.

The resources at Fort Wingate are incorporated by reference from the Use of Tributyl Phosphate in the Intercept Debris Measurement Program at WSMR EA [TBP IDMP EA, (MDA, 2004b)] and the TMD ETR EIS (SSDC, 1994a). Exhibit 3-16 presents the documents incorporated by reference for each of the resource areas.

Exhibit 3-16. Resource Area Descriptions of Affected Environment for Fort Wingate

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	TMD ETR EIS
Airspace	Yes	TMD ETR EIS
Biological Resources	Yes	TBP IDMP EA
Cultural Resources	Yes	TMD ETR EIS
Geology and Soils	Yes	TMD ETR EIS
Hazardous Materials and Waste	Yes	TBP IDMP EA
Health and Safety	Yes	TBP IDMP EA
Land Use	Yes	TMD ETR EIS
Noise	Yes	TMD ETR EIS
Socioeconomics/Environmental Justice	Yes	TBP IDMP EA
Transportation and Infrastructure	Yes	TMD ETR EIS
Visual Resources	Yes	TMD ETR EIS
Water Resources	Yes	TMD ETR EIS

Brief descriptions of these resource areas are provided below.

3.9.1 Air Quality

FWAD is located in McKinley County, which is in attainment (or unclassifiable) for all Federal criteria pollutants. The NMEIB currently operates an air monitoring network with stations located throughout the state of New Mexico. Three stations are located near FWAD: Gallup, Shiprock, and Farmington. These cities are expected to have more emission sources, such as cars and factories, than does FWAD; therefore the data recorded at these monitors can be used as a conservative representation of existing air quality in the FWAD area. Monitored pollutant levels generally remained well below their respective AAQS. Air quality in the FWAD area is considered good. No monitoring data for ozone are available for any of the sites near FWAD. (SSDC, 1994a)

Under the proposed action, FTF targets would be transported by air to Kirtland AFB. Kirtland AFB is located in Bernalillo County, which is in attainment for most of the Albuquerque-Bernalillo County AAQS (NO_2, ozone, SO_2, PM_{10}, Pb, hydrogen sulfide, and total reduced sulfur). Bernalillo County has been designated as "in maintenance status" for CO. Kirtland AFB is currently subject to Federal conformity rule requirements because of the maintenance classification. However, Bernalillo County (including Kirtland AFB) has received approval from EPA for its CO Limited Maintenance Plan, which eliminates the conformity requirements found in Title 20, Chapter 11 of the New Mexico Administrative Code. This plan took effect in June 2006 and makes conformity analyses unnecessary. (USACE, 2007)

3.9.2 Airspace

In 2000, FAA established four restricted areas designated R-5117, Fort Wingate, New Mexico; R-5119, Socorro, New Mexico; R-5121, Fort Wingate, New Mexico; and R-5123, Magdalena, New Mexico. The WSMR facility itself lies in Class G airspace (formerly uncontrolled airspace) and beneath Class E airspace floored at 365 m (1,200 ft). (SSDC, 1994)

3.9.3 Biological Resources

Three major plant communities, coniferous forest, coniferous woodland, and desert scrub, occur in the Fort Wingate area. Common wide-ranging resident animals on Fort Wingate include side-blotched lizard, yellow-rumpled warbler, lesser goldfinch, coyote, and mule deer. Zuni fleabane (*Erigeron rhizomatus*), a federally threatened plant species, is known to occur east of Fort Wingate at old Fort Wingate and may potentially occur along the flight corridor. (SSDC, 1994c) The Mexican spotted owl (*Strix occidentalis lucida*), a federally threatened species, is located in the Fort Wingate region and may occasionally be within Fort Wingate boundaries as a transient.

Two areas on Fort Wingate have been designated as wetlands by the U.S. Department of the Interior and the USACE. Lake McFerren is a small 0.8-hectare (2-acre) impoundment in the southeastern corner of Fort Wingate, and Lake Knudsen is an 8-hectare (20-acre) ephemeral playa-type lake located in the east-central portion. Critical habitat for the Mexican spotted owl has been established on the southern portion of Fort Wingate. (MDA, 2004b)

3.9.4 Cultural Resources

Several cultural resource investigations have been conducted in the area surrounding FWAD but very few within property boundaries. Two prehistoric burial sites are the only known recorded traditional American Indian resources on FWAD.

3.9.5 Geology and Soils

The principle geologic formations exposed on FWAD range in age from Permian to Cretaceous. The oldest is the Glorieta Sandstone/San Andres limestone. This is overlain by the Chink claystone and surface alluvium of the Rio Puerco river valley. In the northern part of FWAD the Cretaceous beds are absent and Triassic-age or older strata are present. In the southeastern corner of FWAD, Cretaceous, Jurassic, and Triassic formations are absent, leaving Permian strata exposed. There are no unique geologic resources within the ROI.

Bamac gravelly loam covers much of the area and has a moderate potential for erosion by water. Some of the soils in the area have a moderate to severe potential for erosion by water and wind. (SSDC, 1994a)

3.9.6 Hazardous Materials and Waste

Hazardous materials associated with flights include propellants, unleaded gasoline, oils, and hydraulic fuel. The unleaded gasoline, oil, and hydraulic fuel are primarily used by ground vehicles. Usage of hazardous materials at Fort Wingate must conform with Federal and DoD hazardous materials management requirements, as well as with the Range Pollution Prevention Program and Environmental Compliance Program.

Hazardous materials are stored in a designated hazardous materials storage location until use. Users of hazardous materials provide storage in accordance with established procedures applicable to individual operations. Most of the hazardous material brought to Fort Wingate is used up in operational processes. Any remainder is collected as hazardous waste. Hazardous waste is transported from Fort Wingate by a licensed hazardous waste transporter to an approved offsite hazardous waste treatment, storage and disposal facility.

3.9.7 Health and Safety

Through WSMR, Fort Wingate provides a Safety and Health program for all employees, and ensures that visitors are advised of potential hazards present at the facility. Onsite Emergency Services provides emergency response to fire, explosion, chemical release, and associated medical emergencies.

Any program involving missile flight safety at Fort Wingate must undergo a thorough safety review, a risk analysis, and preparation of SOPs. Before conducting operations that may involve ground impact of objects within the range, an evaluation is made to ensure that populated areas, critical range assets, and any civilian property potentially susceptible to damage are outside potential impacts limits. RCC 321-02, *Common Risk Criteria for National Test Ranges*, is used to set requirements for acceptable risk criteria to occupational and non-occupational personnel, test facilities, and nonmilitary assets during range operations.

3.9.8 Land Use

FWAD is located in northwest New Mexico approximately 6 km (4 mi) southeast of the city of Gallup, New Mexico. It is situated on rolling terrain and consists of 8,827 hectares (21,812 acres). FWAD is currently closed and in caretaker status awaiting transfer. Caretaker status is provided by Tooele Army Depot under the administration of the U.S. Army Materiel Command. Approximately 2,347 hectares (5,800 acres) on FWAD are forested, primarily with pinyon and juniper. There have been no commercial harvests on FWAD. Currently there are no grazing leases on FWAD. The only known mineral resources on FWAD are sand and gravel, which are not mined. The potential exists for occurrence of other minerals commonly found in the region. (SSDC, 1994a)

3.9.9 Noise

The primary noise sources in the vicinity of FWAD include aircraft operations, range operations, and surface traffic on local roads. The nearest noise-sensitive receptors are at ranches near FWAD and in the communities of Fort Wingate, Bread Springs, Church Rock, Wingate, and McGuffey.

3.9.10 Socioeconomics and Environmental Justice

As reported in the 2000 census, McKinley County has a population of 74,798. There is a large minority population in Fort Wingate (84.6%) compared to New Mexico and the U.S. as a whole. McKinley County's minority population is predominately of Native American origin. It is the only county in the state where Native Americans comprise the majority of the population. (MDA, 2004b)

According to 1999 statistics, McKinley County has a large percentage of persons below poverty level (36.1%), effectively doubling the statewide percentage (18.4%). (MDA, 2004b)

3.9.11 Transportation and Infrastructure

FWAD has approximately 241 kilometers (150 miles) of road (81 paved, 69 gravel or dirt-surfaced). The primary roads, which have an asphaltic concrete or low bituminous surface, form the arterial system of the depot and link the various activity areas and igloo clusters. Most of the roads in the primary system are in poor to fair condition. (SSDC, 1994a)

Gallup, the transportation hub for McKinley County, is serviced by Interstate 40 to the east and west, U.S. Highway 666 to the north, and New Mexico Highway 602 to the south. The north-south road system and interconnecting roads are not extensively developed because of the rural, sparsely populated character of the county. (SSDC, 1994a)

Railroad access to FWAD is via a "y" tie with the Santa Fe Railroad line. The internal rail system comprises 35 kilometers (22 miles) of track rated at a 41-kilogram (90-pound) capacity, a classification yard with 306-railcar capacity, 17 loading docks, a scale, and a locomotive garage maintenance facility. Additionally, Gallup has a fully equipped airport for light aircraft. Daily commercial flights are provided by Mesa Airlines. (SSDC, 1994a)

3.9.12 Visual Resources

Fort Wingate is located within an area categorized by rugged topography. Natural resources of aesthetic value include the Hogback, the Zunni Mountains, and the Puerco River. Additionally, portions of FWAD are forested. There are no known areas of aesthetic concern within the FWAD area.

3.9.13 Water Resources

Water for FWAD is provided by on-site wells. Surface water is not used as a source of potable water on FWAD. The major aquifer in the region is the Glorieta sandstone/San Andres limestone, which provides water through a single deep artesian well located beneath Building 69 in the administration area. Undeveloped, shallow alluvial aquifers composed of sand, silt, and clay with gravel lenses occur along the northern edge of FWAD. Water quality at FWAD is generally good.

The region around Gallup, including FWAD, was declared an underground water basin which prohibits any major new ground water withdrawals without approval by the State Engineer. The potential for surface water and ground water contamination has been identified on FWAD. (SSDC, 1994a)

3.10 Yuma Proving Ground, Arizona

The U.S. Army YPG is located adjacent to the Colorado River in the Sonoran Desert of southwestern Arizona. YPG is 37 kilometers (23 miles) northeast of the city of Yuma and approximately 200 kilometers (125 miles) west of the city of Phoenix. Larger in size than the state of Rhode Island, it covers a total of 337,000 hectares (832,000 acres). The overall climate is extremely warm and arid with temperatures periodically in excess of 120°F. It has an annual average of 350 sunny days and only seven centimeters (three inches) of rain per year. The topography is basin and range with elevations from 46 to 853 meters (150 to 2,798 feet) above mean sea level. The DoD range is currently used to test military equipment, weapons, vehicles, and aviation systems in a desert environment. (US Department of the Army YPG, 2006)

The resources for YPG are incorporated by reference from the Final Range Wide EIS U.S. Army YPG, Yuma and La Paz Counties, Arizona (U.S. Department of the Army, 2001). Exhibit 3-17 shows where the discussion for each resource area can be found.

Exhibit 3-17. Resource Area Descriptions of Affected Environment for YPG

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	Final Range Wide EIS U.S. Army YPG
Airspace		
Biological Resources		
Cultural Resources		
Geology and Soils		
Hazardous Materials and Waste		
Health and Safety		
Land Use		
Noise		
Socioeconomics and Environmental Justice		
Transportation and Infrastructure		
Visual Resources		
Water Resources		

As mentioned in the introduction to this section, brief descriptions of only the air quality, hazardous materials and waste, and health and safety resource areas are provided below.

3.10.1 Air Quality

Although Yuma County and a small portion of the Laguna Region located within YPG are considered nonattainment for PM_{10}, data from the Arizona Department of Environmental Quality (ADEQ) for 1991-1995 do not show exceedances of the NAAQS. YPG is considered a synthetic minor source of air emissions by ADEQ. YPG has agreed to reduce the potential to emit below the major source cutoff by accepting a federally enforceable limit. In addition, YPG is required to accept restrictions in Arizona's SIP or during new source review which limit certain operations or activities to below specified levels. Some installation activities that could impact air quality are vehicle maintenance, dust course maneuvers, smoke testing, construction projects, open burning, and generator usage. The Army calculates the extent and generation of particulate matter at the installation. Best management practices and preventive measures, such as training and coordination between testers and environmental programs, are implemented to ensure the least impact to air quality by installation activities.

The primary sources of the 5,300 metric tons (5,800 tons) per year of PM_{10} in Yuma County are from agricultural tilling, vehicles, and construction. In 1994 YPG and ADEQ implemented a Memorandum of Understanding stipulating an SIP that requires YPG to surface some open lands with concrete and to use dust palliatives on others. YPG submits an annual report to ADEQ that summarizes the facility's activities in implementing dust control measures.

DoD Directive 6050.9 and other Federal regulations and laws require the Army to regulate and phase out the use of ozone-depleting chemicals (ODCs) such as halons, carbon tetrachloride and chlorofluorocarbons (CFCs). The YPG pollution prevention program requires recycling of refrigerants containing ODCs, replacing these refrigerants with alternate coolants as they become available, and retrofitting or replacing existing equipment. ODCs must be recovered before turning equipment over to the Defense Reutilization and Marketing Office or a contractor.

Smokes and obscurants are employed at YPG to mask both troop and mechanized equipment movements during training. Graphite flake aerosols used as obscurants fall under the NAAQS PM_{10} standards. Airborne concentrations may exceed safe short-term limits for humans within several kilometers of the source.

The ADEQ Air Quality Division evaluated open burning and open detonation (OB/OD) activities at the site and issued an air permit. Permitted OB/OD operations are limited to approved burn times and to quantities. During approved burn times, winds do not carry smoke or residue beyond YPG boundaries. The results of a facility-wide 1993 Air Pollution Emission Statement were used in the Operating Air Permit Application. Some sources (degreasers and generators) were deemed permitted sources by ADEQ and are regulated under the permit and are included in the annual air emissions inventory. The rest of the activities were categorized by ADEQ as insignificant activities. The 1996 air emissions inventory indicated levels of criteria air pollutants, VOCs, and HAPs were well below established Federal and State regulatory standards. (U.S. Department of the Army, 2001)

3.10.2 Hazardous Materials and Waste

Gasoline, diesel, and chlorine are substances present at YPG in large amounts. They are stored at quantities above reporting limits. They are reported in the Tier Two Emergency and Hazardous Chemical Inventory submitted to the Arizona Emergency Response Commission and the local Emergency Planning Committee. Hazardous substances are stored according to Army regulations and all applicable Federal, State, and local ordinances.

Fuels are stored, transferred, and transported on the installation. Fuels are stored in ASTs and USTs. There are currently 18 ASTs and 51 USTs at YPG. The majority of petroleum, oils and lubricants are stored in large storage tanks (either above or below ground). However, small amounts are stored in individual sites scattered through industrial working areas for use as necessary in maintenance and repair of vehicles. As an Army testing facility, YPG stores, utilizes, and destroys considerable quantities of propellants, explosives, and pyrotechnics. The only known PCBs at YPG are in transformer oil.

Hazardous wastes generated at YPG have been managed successfully using the existing hazardous waste storage Facility (HWSF) located in the Laguna Region. Hazardous wastes and expired hazardous substances accumulate at this location while awaiting disposal. No wastes from outside YPG are accepted at the HWSF. No treatment is conducted and no wastes are disposed of at the HWSF. (U.S. Department of the Army, 2001)

3.10.3 Health and Safety

Extreme climate and rugged terrain poses potential hazards to personnel working outdoors on extensive ground-based projects. Personnel are cautioned to limit activities during severe heat and humidity and increase water intake. Due to the lack of immediately available medical attention, remote locations pose potential risks to personnel health and safety. Personnel minimize this risk by carrying cellular phones and two-way radios.

Operations involve research, development, test and evaluation of military vehicles and weapons systems. Specific safety issues for a particular test environment are addressed through SOPs for each test or piece of equipment. The public is discouraged from wandering onto ranges. Warning signs are posted and safety briefings are conducted before access is granted. USAYPG Regulation 385-1 and a series of SOPs guide range safety in both the Cibola and Kofa Regions.

3.11 Hill AFB, Utah

Hill AFB is a 2,711-hectare (6,700-acre) Air Force Material Command facility located 8 kilometers (5 miles) south of Ogden, Utah, and about 48 kilometers (30 miles) north of Salt Lake City. (MDA, 2002b) It is bordered by the Wasatch Mountains on the east and overlooks the Great Salt Lake to the west. As part of its mission, the base provides a full range of maintenance and logistics support for space and command, control, communication and intelligence systems. (SSDC, 1995b) Hill AFB also supports missile programs such as the Peacekeeper and Minuteman III. (MDA, 2002b)

The resources at Hill AFB are incorporated by reference from the Minuteman III Propulsion Replacement Program, Hill AFB, Utah EA. (U.S. Department of the Air Force, 2001) Exhibit 3-18 presents the documents incorporated by reference for each of the resource areas.

Exhibit 3-18. Resource Area Descriptions of Affected Environment for Hill AFB

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	Minuteman III Propulsion Replacement Program, Hill AFB, Utah EA
Airspace	No	N/A*
Biological Resources	Yes	Minuteman III Propulsion Replacement Program, Hill AFB, Utah EA
Cultural Resources		
Geology and Soils		
Hazardous Materials and Waste		
Health and Safety		
Land Use		
Noise		
Socioeconomics/ Environmental Justice	No	N/A*
Transportation and Infrastructure	Yes	Minuteman III Propulsion Replacement Program, Hill AFB, Utah EA
Visual Resources	No	N/A*
Water Resources	Yes	Minuteman III Propulsion Replacement Program, Hill AFB, Utah EA

* This resource area is not applicable for determining potential impacts of transportation and staging of FTF targets at Hill AFB.

A short description is provided for the air quality, hazardous materials and waste, and health and safety resource areas which would be potentially impacted by transportation and pre-launch staging activities for FTF targets.

3.11.1 Air Quality

Hill AFB is located in Davis County, Utah, which is designated by EPA as a maintenance area for ozone and as an attainment area for all other NAAQS. Minimal amounts of HAPs and VOCs are currently emitted during the assembly/disassembly of the Minuteman III missiles on the base from the use of cleaning solvents, primers, sealers, and adhesives. During Calendar Year 2001, approximately 49 pounds (0.025 ton) of VOCs and 14 pounds (0.007 ton) of HAPs were emitted from products used during missile assembly and disassembly operations. (U.S. Department of the Air Force, 2001)

3.11.2 Hazardous Materials and Waste

All hazardous materials used at Hill AFB are properly stored in an explosives chemical cabinet. Waste sealer, adhesives, and disposable rags contaminated with waste solvents and isopropyl alcohol are generated in the missile assembly and disassembly process at the base and collected in drums. Samples of these wastes are analyzed by the Hazardous Waste Control Facility to determine whether they are hazardous or not. In 2000, one hazardous waste drum and three other drums were found to be non-hazardous. Both non-hazardous waste and hazardous waste drums are removed by Safety Kleen and disposed of accordingly at either non-RCRA or approved RCRA hazardous waste disposal facilities. (U.S. Department of the Air Force, 2001)

3.11.3 Health and Safety

Safety at Hill AFB is under the directorate of the Ogden Air Logistics Safety Office, which has three divisions: Weapons Safety, Ground Safety, and Systems Safety. The health of personnel at Hill AFB is under Bioenvironmental Engineering Services. No health or safety issues were found in a bioenvironmental engineering survey conducted in 2001. Friable and non-friable asbestos-containing materials have been identified in several buildings at Hill AFB. Hill AFB will evaluate and comply with all abatement requirements in the event that asbestos removal is required. (U.S. Department of the Air Force, 2001)

3.12 Elmendorf AFB, Alaska

Elmendorf AFB is located directly north of the city of Anchorage, Alaska and west of U.S. Army Fort Richardson. The base covers a total of 5,445 hectares (13,455 acres), with 1,502 hectares (3,713 acres) of improved areas. Elmendorf AFB is part of the Pacific Air Forces, which is one of nine major commands of the U.S. Air Force, and is a beddown location for both fighter and cargo transport aircraft. (U.S. Department of the Air Force, 2006b)

The resources at Elmendorf AFB are incorporated by reference from the F-22 Beddown at Elmendorf AFB, Alaska EA (U.S. Department of the Air Force, 2006b) and the Final EA C-17 Beddown, Elmendorf AFB, Alaska (U.S. Department of the Air Force, 2004). Exhibit 3-19 presents the documents incorporated by reference for each of the resource areas.

Exhibit 3-19. Resource Area Descriptions of Affected Environment for Elmendorf AFB, Alaska

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	F-22 Beddown at Elmendorf AFB, Alaska EA
Airspace		
Biological Resources		
Cultural Resources		
Geology and Soils		
Hazardous Materials and Waste		
Health and Safety		
Land Use		
Noise		
Socioeconomics and Environmental Justice		
Transportation and Infrastructure		
Visual Resources	Yes	Final EA C-17 Beddown, Elmendorf AFB, Alaska
Water Resources		F-22 Beddown at Elmendorf AFB, Alaska EA

Brief descriptions of the air quality, hazardous materials and waste, and health and safety resource areas are provided below.

3.12.1 Air Quality

Elmendorf AFB is located on the outskirts of Anchorage within the Cook Inlet Intrastate air quality control region 8 (AQCR 8). (40 CFR 81) Anchorage is classified as in attainment with Federal NAAQS for all criteria pollutants except for the community of Eagle River, 10 miles northeast of Elmendorf AFB, which is designated as nonattainment for PM_{10}. However, a portion of Anchorage that is adjacent to the southern boundary of Elmendorf AFB is currently operating under a maintenance plan to assure continued attainment with the CO standard. Elmendorf AFB is not within a Prevention of Significant Deterioration area. Elmendorf AFB is considered to be a major source of air emissions and has divided into nine different facilities for permitting purposes. Only two of eight facilities, the Elmendorf Hospital and the Elmendorf Flightline, have potential criteria pollutant emissions large enough to require Federal Title V operating permits. Elmendorf AFB also holds Owner Requested Limits, not included in the Title V permits, for Fire Protection Pumps and Road Painting. Existing stationary source emissions are described in Exhibit 3-20.

Exhibit 3-20. Estimated Baseline Potential Stationary Source Emissions at Elmendorf AFB

Description	Annual Emissions (tons per year)				
	NO_X	CO	PM_{10}	SO_X	VOC
Flight Line	164	99	27	158	29
Communications	54	15	6	29	14
Real Estate	111	92	12	1	6
Automotive Repair and Services	5	4	3	< 1	6
Health Services	58	33	4	26	3
Admin/Engineering	84	54	14	9	5
Fire Prevention	38	13	3	4	3
National Security	3	2	< 1	< 1	< 1

Source: U.S. Department of the Air Force, 2006b

A total of 41,340 aircraft operations, involving 83 Elmendorf-based aircraft and transient users occurred at Elmendorf AFB during 2005. Existing mobile source emissions are described in Exhibit 3-21.

Exhibit 3-21. Estimated Baseline Mobile Source Emissions at Elmendorf AFB

Description	Annual Emissions (tons per year)				
	NO_X	CO	PM_{10}	SO_X	VOC
Aircraft based at Elmendorf AFB	529	353	95	144	59
Transient Aircraft	72	150	43	17	8
On-Wing Engine Testing	17	1	< 1	< 1	< 1
Aerospace Ground Support Equipment	175	25	8	5	1
Non-Road/Non-Vehicle Equipment	< 1	8	3	< 1	< 1
Government-Owned Vehicles	13	73	7	12	1
Privately-Owned Vehicles	33	367	24	215	3
TOTAL	**840**	**967**	**180**	**393**	**73**

Source: U.S. Department of the Air Force, 2006b

For comparison purposes, Exhibit 3-22 lists emissions for the Greater Anchorage Area, and for Cook Inlet AQCR (AQCR 8, which includes the borough).

Exhibit 3-22. Regional Emissions for Elmendorf AFB Affected Environment

	Pollutants (tons per year)				
	NO_X	CO	PM_{10}	SO_2	VOC
Greater Anchorage Area	10,740	123,883	19,856	920	5,764
Total Cook Inlet AQCR	28,203	332,021	67,013	1,780	56,708

Source: U.S. Department of the Air Force, 2006b

3.12.2 Hazardous Materials and Waste

Hazardous materials used at Elmendorf AFB are controlled through an Air Force pollution prevention process called Hazardous Materials Pharmacy. Elmendorf AFB is a large-quantity hazardous waste generator (USEPA identification number AK8570028649). Hazardous wastes generated at the AFB include combustible solvents from parts washers, inorganic paint chips from lead abatement projects, fuel filters, metal-contaminated spent acids from aircraft corrosion control, painting wastes, battery acid, spent x-ray fixer, corrosive liquids from boiler operations, toxic sludge from wash racks, aviation fuel from tank cleanouts, and pesticides. Hazardous wastes are managed in accordance with the Elmendorf AFB OPlan 19-3. In FY 2005, 56,568 pounds of hazardous waste were removed from Elmendorf AFB and disposed of in off-base permitted disposal facilities. The Elmendorf AFB SPCC Plan addresses on-base storage locations and proper handling procedures of all hazardous materials to minimize potential spills and releases. A register of asbestos-containing facilities is maintained by Civil Engineering, and the Asbestos Management Plan provides guidance on the management of asbestos at the facility.

In August 1990, Elmendorf AFB was placed on the National Priorities List bringing it under the Federal facility provisions of CERCLA Section 120. Currently the Air Force has identified 85 sources of contamination from operations that occurred prior to 1984. These sources have been placed into three groups: CERCLA sources (40 sources), state program sources (40 sources) and RCRA sources (5 sources). These sites are in various stages of remediation, and are all managed under Elmendorf AFB's Environmental Restoration Program. (U.S. Department of the Air Force, 2006b)

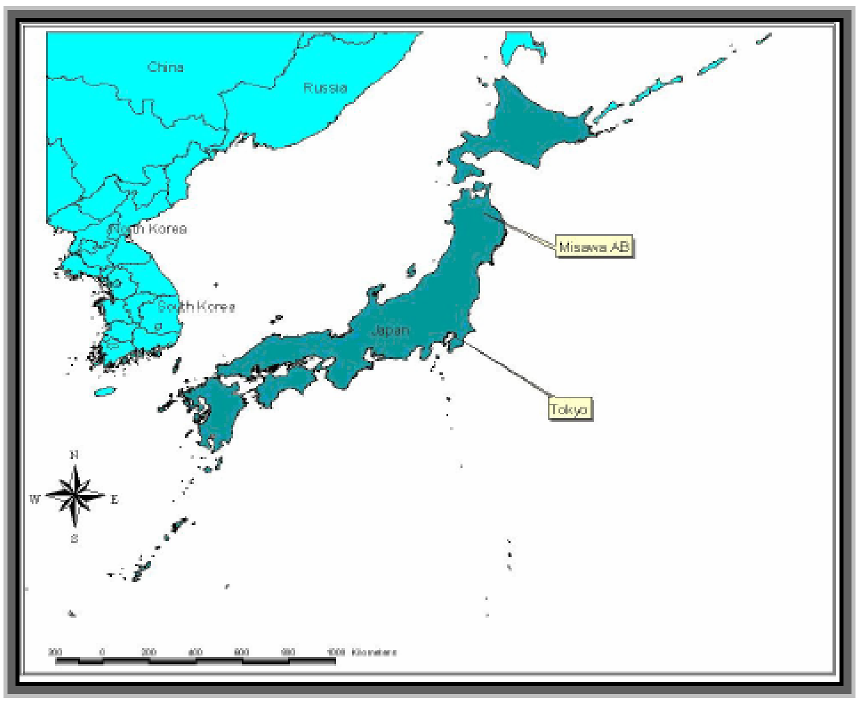
3.12.3 Health and Safety

Ongoing operations and maintenance activities at Elmendorf AFB are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force OSHA. The 3 WG fire department provides fire and crash response at Elmendorf AFB. Elmendorf AFB is considered to have a Class B runway. All activities associated with the receipt, processing, transportation, storage maintenance, and loading of munitions items is accomplished by qualified technicians in accordance with DoD and Air Force technical procedures. Two explosive safety waivers are in effect at Elmendorf AFB that involve two storage facilities whose safety arc encroaches on an on-base transportation route. (U.S. Department of the Air Force, 2006b)

3.13 Misawa Air Base, Japan

Misawa AB is located approximately 644 kilometers (400 miles) north of Tokyo and adjacent to Misawa City in the Aomori Prefecture in Tohoku. Approximately 5,200 U.S. military personnel, 300 U.S. civilian employees, and 900 local Japanese employees are stationed there. Misawa AB is the only combined joint service installation in the western Pacific region, housing units representing all four U.S. services as well as the Japan Air Self Defense Force. (U.S. Department of the Navy, 2002c) Exhibit 3-23 shows the location of the Misawa AB in Japan.

Exhibit 3-23. Location of Misawa Air Base, Japan



Source: USACE, 2003

Brief descriptions for the air quality, hazardous materials and waste, and health and safety resource areas at Misawa AB are provided below.

3.13.1 Air Quality

Japan does not have formally established significance thresholds for the maximum daily allowable air pollutant emissions, and so specific air quality data are not available for the

Misawa area. (USACE, 2003) All activities at Misawa AB must comply with the JEGS. The JEGS are a compilation of U.S. environmental law and Japan environmental standards as negotiated by the staff of U.S. Forces Japan, the U.S. State Department, and the Environmental Agency of Japan. (U.S. Department of the Navy, 2002c)

3.13.2 Hazardous Materials and Waste

The Environmental Department at Misawa AB provides hazardous material management and hazardous waste disposal and recycling services. The AB has implemented a Joint Forces Hazardous Waste Management Plan to reduce the amount of hazardous materials and hazardous waste used and generated on base. The Environmental Department operates a joint hazardous materials pharmacy to track quantities of hazardous materials and identify opportunities for reduced hazardous materials use. Only trained and certified hazardous materials personnel may receive issues from hazardous materials pharmacy, which reduces the potential for improper handling and spills. The AB has twelve hazardous waste accumulation points that feed into a single hazardous waste storage area. (U.S. Department of the Navy, 2002c)

3.13.3 Health and Safety

Misawa AB enforces established SOPs to meet occupational and system safety requirements. Health and safety requirements at the AB include monitoring and prevention of worker exposure to workplace chemicals and physical hazards, hearing and respiratory protection, and oversight of all hazardous or potentially hazardous operations.

Misawa AB has coordinated a site emergency plan with each of the joint forces stationed at the AB, the Base Fire Department, the Disaster Preparedness Office, and the Base Inspector General. The joint forces regularly participate in disaster training exercises, hazardous materials and spill response events, and mass casualty drills. (U.S. Department of the Navy, 2002c)

3.14 Pearl Harbor, Hawaii

Pearl Harbor is the largest estuary in Hawaii, located on the south coast of the Island of Oahu. It is fed by nine streams, encompasses about 8 square miles (20.7 square kilometers) of surface water, and includes approximately 36 miles (57.9 kilometers) of shoreline. Pearl Harbor is completely under the control of the U.S. Navy, and is divided by the Waipio and Pearl City peninsulas into three main lochs, West Loch, Middle Loch and East Loch, and a smaller loch, Southeast Loch. The lochs join to form a single channel entrance. (Naval Facilities Engineering Command, 2005) The Naval Station Pearl Harbor encompasses approximately 1,107 acres of land along the eastern and southern shorelines of East Loch and Ford Island. (U.S. Department of the Navy, 2002a and Global Security, 2006)

Naval Station Pearl Harbor provides service comparable to a large city. Operating the Navy's busiest harbor, Naval Station annually completes 65,000 boat runs and transports 2.4 million passengers and 200,000 vehicles to and from Ford Island and other harbor locations. (Global Security, 2006) A major portion of the operations area at Pearl Harbor is used for maintenance and supply/storage largely located adjacent to ship berthing and repair areas. Other land uses are family and bachelor housing, support and headquarters facilities, and tank farms. Open areas are used for staging during large-scale exercises and operations. (U.S. Department of the Navy, 2002a)

Pearl Harbor has been listed as a National Historic Landmark since 1964. There are about 1,400 buildings and structures eligible for listing on the National Register. Consultation with the SHPO would be required before performing any activity that may impact the National Historic Landmark. (U.S. Department of the Navy, 2002a)

Descriptions of the resources at Pearl Harbor are incorporated by reference from the GMD ETR EIS (MDA, 2003a), the EA for Waterfront Facilities Maintenance and Improvements, Pearl Harbor Naval Complex, Oahu, Hawaii (Naval Facilities Engineering Command, 2005), and the Ford Island Development PEIS (U.S. Department of the Navy, 2002a) as outlined in Exhibit 3-24.

Exhibit 3-24. Resource Area Descriptions for Pearl Harbor

Resource Area	Incorporated by Reference	Location of Description of Affected Environment
Air Quality	Yes	GMD ETR EIS
Airspace	Yes	GMD ETR EIS
Biological Resources	Yes	EA for Waterfront Facilities
Cultural Resources	Yes	EA for Waterfront Facilities
Geology and Soils	Yes	EA for Waterfront Facilities and Ford Island Development PEIS
Hazardous Materials and Waste	Yes	GMD ETR EIS
Health and Safety	Yes	GMD ETR EIS
Land Use	Yes	EA for Waterfront Facilities
Noise	Yes	EA for Waterfront Facilities
Socioeconomics and Environmental Justice	Yes	EA for Waterfront Facilities
Transportation and Infrastructure	Yes	EA for Waterfront Facilities and Ford Island Development PEIS
Visual Resources	Yes	GMD ETR EIS
Water Resources	Yes	EA for Waterfront Facilities and Ford Island Development PEIS

Because Pearl Harbor will serve as the staging location for sea launches, brief descriptions of air quality, hazardous materials and waste, and health and safety resource areas are provided below.

3.14.1 Air Quality

The entire state of Hawaii is in attainment for all Federal NAAQS. Emissions in the area around Pearl Harbor are well below state and Federal AADC. (MDA, 2003a)

3.14.2 Hazardous Materials and Waste

The Coast Guard 14th District Marine Safety Office Honolulu is responsible for the enforcement of hazardous material and hazardous waste regulations and policies for navigable waterways and adjoining shorelines and for response to spills and releases. An Area Committee composed of industry, Federal, state, and local regulatory representatives, serves as a regional spill preparedness and planning group. In compliance with the National Contingency Plan (40 CFR Part 300) and the Oil Pollution Act of 1990, the Committee, with assistance and oversight from the Coast Guard, developed an Area Contingency Plan outlining regional spill response procedures. Hazardous waste and nonhazardous waste generated during routine operations at Pearl Harbor may include waste rags, paint, spent solvents, spill residues and absorbent materials, corrosion prevention compound in aerosol cans, ethylene glycol, batteries, antifreeze, hydraulic fluid, waste oil, photo processing waste materials, cleaning compounds, spill cleanup materials, and empty containers. Environmental compliance policies and procedures applicable to shipboard operations are defined in OPNAVINST 5090.1B (1999), Chapter 19. Navy ships are required to comply with stringent hazardous materials and waste discharge, storage, dumping, and pollution prevention requirements. (MDA, 2003a)

3.14.3 Health and Safety

The Coast Guard enforces marine safety regulations implemented to reduce or eliminate death, injury, economic loss, and environmental damage associated with commercial marine and military vessels. Marine Safety Office responsibilities include inspecting commercial vessels and marine facilities, supervising the transfer of oil, hazardous materials and explosive and military cargoes, investigating and remediating oil spills and hazardous materials releases, investigating vessel casualties and licensing of merchant vessels. The Coast Guard is also responsible for developing and issuing local NOTMARs. The World-Wide Navigational Warning Service also provides long range and coastal warning messages as well as special warnings of potential political or military hazards that may affect safety of U.S. shipping lanes to U.S. Navy and merchant ships through a worldwide radio and satellite broadcast system. (MDA, 2003a)

3.15 Broad Ocean Area

Proposed activities in the BOA would take place at a distance of several hundred kilometers from any land mass. The BOA is subject to EO 12114, *Environmental Effects Abroad of Major Federal Actions,* which requires consideration of Federal actions abroad with the potential for impacts to the environment.

The Pacific Ocean is comprised of approximately 156 million square kilometers (60 million square miles) and includes the Bali Sea, Bering Sea, Bering Strait, Coral Sea, East China Sea, Flores Sea, Gulf of Alaska, Gulf of Tonkin, Java Sea, Philippine Sea, Savu Sea, Sea of Japan, Sea of Okhotsk, South China Sea, Tasman Sea, Timor Sea, and other tributary water bodies. Its maximum length is 14,500 kilometers (9,000 miles) and its greatest width is 17,700 kilometers (11,000 miles), which lies between the Isthmus of Panama and the Malay Peninsula. (MDA, 2007a)

The Atlantic Ocean is comprised of approximately 76.8 million square kilometers (29.6 million square miles) and includes the Baltic Sea, Black Sea, Caribbean Sea, Davis Strait, Denmark Strait, part of the Drake Passage, Gulf of Mexico, Mediterranean Sea, North Sea, Norwegian Sea, almost all of the Scotia Sea, and other tributary water bodies. The Atlantic Ocean extends from the North Pole southward for about 16,100 kilometers (10,000 miles) to the Antarctic continent, and covers 106 million square kilometers (41 million square miles). The width of the Atlantic varies from approximately 2,850 kilometers (1,770 miles) between Brazil and Liberia to 4,830 kilometers (3,000 miles) between Norfolk, VA, and Gibraltar. The average depth is about 3,660 meters (12,000 feet) and the greatest depth is 8,650 meters (28,400 feet) in the Puerto Rico Trench. (MDA, 2007a)

3.15.1 Air Quality

No sources of ambient air quality monitoring data are known to exist for the BOA. There are no known existing emission sources in the Pacific Ocean. Air quality over the Pacific Ocean is expected to be good because there are no major sources of air pollution, and the nearly constant trade winds in the area serve to disperse any pollutants from transient sources, such as passing seagoing vessels or low-flying aircraft.

In the Atlantic Ocean, there is potential for large, thick plumes of aerosols blowing eastward over the North Atlantic. The aerosol plume is the regional haze produced by the industrial northeastern U.S. and typically occurs during the summer months. The haze is composed of sulfates and organics that originate from power plants and automotive sources. Ozone and other pollutants found in the Atlantic Ocean are primarily the result of anthropogenic sources. (MDA, 2007a)

Because the airspace in the BOA is beyond the territorial limit and is in international airspace, the procedures of the International Civil Aviation Organization (ICAO), outlined in ICAO Document 444, *Rules of the Air and Air Traffic Services* are followed. The FAA acts as the U.S. agent for aeronautical information to the ICAO. Domestic Warning Areas are established in international airspace to contain activity that may be hazardous and to alert pilots of nonparticipating aircraft to the potential danger.

There are no airports or airfields located in the BOA. High-altitude overseas jet routes cross the Pacific BOA via nine Control Area Extension corridors off the California coast.

3.15.2 Biological Resources

Marine biology of the open ocean consists of the animal and plant life that lives in and just above the surface waters of the sea and its fringes.

3.15.3 Geology and Soils

The Pacific Ocean floor of the central Pacific basin is relatively uniform, with a mean depth of about 4,270 meters (14,000 feet). The Pacific Ocean is surrounded by a zone of violent volcanic and earthquake activity sometimes referred to as the "Pacific Ring of Fire." Icebergs are common in the Davis Strait, Denmark Strait, and the northwestern Atlantic Ocean from February to August and have been spotted as far south as Bermuda and the Madeira Islands. (MDA, 2007a)

The principal feature of the bottom topography of the Atlantic BOA is a great submarine mountain range called the Mid-Atlantic Ridge. It extends from Iceland in the north to approximately 58 degrees south latitude, reaching a maximum width of about 1,600 kilometers (1,000 miles).

3.15.4 Hazardous Materials and Hazardous Waste

For test events using sea-based platforms, hazardous materials would be handled and used in accordance with all applicable state and Federal regulations as well as range-specific and U.S. Navy SOPs.

The CWA prohibits the discharge of hazardous substances into or upon U.S. waters out to 370 kilometers (200 nautical miles). Also shipboard waste handling procedures for commercial and U.S. Navy vessels govern the discharge of hazardous wastes as well as non-hazardous waste streams. These categories include "blackwater" (sewage); "greywater" (leftover cleaning water); oily wastes; garbage (plastics, nonplastics, and food-contaminated waste); hazardous wastes; and medical wastes. (MDA, 2007a)

The Uniform National Discharge Standards provisions of the CWA provide for the evaluation of the 39 discharges from U.S. Navy Vessels. Section 312(n)(2)(B) of the

CWA identifies seven factors for consideration when determining if a discharge requires a marine pollution control device: the nature of the discharge; the environmental effects of the discharge; the effect that installing or using the marine pollution control device has on operations or the operational capability of the vessel; applicable Federal and state regulations; applicable international standards; and the economic costs of installing and using the marine pollution control device.

Under the regulations implementing the Act to Prevent Pollution from Ships, as amended, and the Marine Plastics Pollution Research and Control Act, the discharge of plastics, including synthetic ropes, fishing nets, plastic bags, and biodegradable plastics, into the water is prohibited. A slurry of sea water, paper, cardboard, or food waste that is capable of passing through a screen with opening no larger than 12 millimeters (0.4 inch) in diameter may not be discharged within 5.6 kilometers (three nautical miles) of land. Discharge of floating dunnage, lining, and packing materials is prohibited in navigable waters and in areas offshore less than 46.3 kilometers (25 nautical miles) from the nearest land.

Test event sponsors would be responsible for tracking hazardous wastes; for proper hazardous waste identification, storage, transportation, and disposal; and for implementing strategies to reduce the volume and toxicity of the hazardous waste generated. For test events using a sea-based platform, hazardous materials and hazardous waste would be managed in accordance with all applicable state and Federal regulations as well as Range-specific and U.S. Navy SOPs.

The transport, receipt, storage, and handling of hazardous materials would comply with Army TM 38-410, Navy NAVSUP PUB 505, Air Force AFR 69-9, Marine Corps MCO 4450-12 or Defense Logistics Agency DLAM 4145.11, Storage and Handling and Implementing Regulations Governing Storage and Handling of Hazardous Materials.

3.15.5 Health and Safety

The ROI for health and safety in the BOA would be limited to work crews located on sea-based platforms. The WorldWide Navigational Warning Service is a worldwide radio and satellite broadcast system for the dissemination of Maritime Safety Information to U.S. Navy and merchant ships. The WorldWide Navigational Warning Service provides timely and accurate long range and coastal warning messages promoting the safety of life and property at sea and Special Warnings that inform mariners of potential political or military hazards that may affect safety of U.S. shipping.

3.15.6 Noise

Studies of ambient noise of the ocean have found that the sea surface is the predominant source of noise above the water, and that the source is associated with the breaking of waves. (MDA, 2007a) The primary human-made noise source within the BOA is associated with ship and vessel traffic, including transiting commercial tankers and container ships, commercial fishing boats, and military surface vessels and aircraft. Noise sources above the water would also include launch or other activities from sea-based platforms.

Noise also occurs under the ocean surface. The dominant sources of ambient underwater noise and their corresponding frequency ranges are seismic activity, turbulent-pressure fluctuations, and second order pressure effects due to surface gravity waves (1 to 100 hertz [Hz]); ship traffic and industrial activity (10 Hz to 10 kHz); biologics (10 Hz to 100 kHz); sea ice activity (10 Hz to 10kHz); breaking waves, bubbles, and spray (100 Hz to 20 kHz); precipitation (100 Hz to 30 kHz); and thermal effects (30 to 100 kHz). Noise from sources above the water may be magnified underwater. For example, a tug and barge produces sound that measures 171 dB in water and 110 dB in air. (MDA, 2007a)

3.15.7 Transportation

Transportation in the BOA consists predominantly of marine shipping. Marine shipping refers to the conveyance of freight, commodities, and passengers via mercantile vessels.

The two main factors that define ocean water are the temperature and the salinity of the water. (MDA, 2007a) Water quality in the open ocean is considered excellent, with high water clarity, low concentrations of suspended matter, dissolved oxygen concentrations at or near saturation, and low concentrations of contaminants such as trace metals and hydrocarbons

3.16 Atmosphere

The Atmosphere Environment refers to the Atmosphere that envelops all areas of the Earth and consists of the four principal layers of the Earth's atmosphere: troposphere, stratosphere, mesosphere, and ionosphere or thermosphere. These layers are characterized by altitude, temperature, structure, density, composition, and degree of ionization – the positive or negative electric charge associated with each layer. During the past 150 years, combustion of fossil fuels has resulted in increasing concentrations of atmospheric gases that are believed to influence global climate. The temperature of the Earth's atmosphere is determined by three factors: the sunlight it receives, the sunlight it reflects, and the infrared radiation absorbed by the atmosphere. The principle absorbers include CO_2, water vapor, nitrous oxide, CFCs, and methane. (MDA, 2007a)

4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This Section of the EA describes the potential environmental consequences of implementing the proposed action via the proposed action/preferred alternative, alternative 1, and the no action alternative. This section also identifies potential cumulative impacts associated with those alternatives. The CEQ NEPA regulations define cumulative impacts as the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. (40 CFR § 1508.7)

Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. For this EA, potential cumulative impacts are addressed for other DoD activities that would occur at the same locations proposed to be used for FTF activities and also for global cumulative impacts of launches to the atmosphere ion terms of global warming and ozone depletion and impacts of the proposed action on the BOA.

The following section describes the analysis process used to consider environmental impacts associated with the proposed action and alternatives.

4.2 Analysis Process

The environmental analysis of the FTF considered activities related to the proposed action and alternatives. The activities considered include

- Development,
- Preparation,
- Assembly, integration and testing of FTF targets,
- Storage of FTF targets,
- Air and ground transportation of FTF targets to launch and staging locations, and
- Land, air, and sea pre-launch, launch, and post-launch activities for FTF targets.

- **Development activities**. Development activities for the FTF as described in Section 2 of this EA would include the conceptual and physical development of LV-2 and LV-3 target components that have not been used to support previous MDA missions. Individual target boosters proposed to be used in the FTF have been used in other target configurations in the past.

- **Preparation activities.** Preparation activities for the FTF as described in Section 2 of this EA would include activities such as the handling and installation of ordnance on the targets. These activities would produce wastewater, emissions, and generate waste. The proposed design specifications for the FTF targets would prohibit the use of Class I and II ozone depleting substances and the use of toxic chemicals would be minimized to the extent possible. Ordnance handling and installation would likely result in the production of small amounts of regulated wastes and *de minimis* emissions of VOCs and HAPs.

All preparation operations would occur at facilities that employ environmental, safety, and health resources to ensure compliance and risk management. These preparation activities already occur at various facilities in the U.S. in compliance with all appropriate local, state and Federal environmental regulations.

- **Assembly, Integration, and Testing of FTF Targets.** The assembly, integration and testing of FTF solid and liquid propellant targets could include attaching the front section to the booster, loading of simulants or explosives, and spinning of the front section to confirm proper weight distribution. Additionally, integration and stage mating could be performed.

- **Storage of FTF Targets.** Solid propellant FTF targets may require short-term storage at the Courtland Target Assembly Facility if it is not possible to immediately ship the target to its launch/staging location. A fully assembled target could be stored on site at the Courtland Target Assembly Facility in one of the on site storage magazines for up to one year as the result of aircraft or mission delay, launch delays, or production scheduling. Some FTF ground support equipment and components as well as chemical simulants may be stored at the Courtland Target Assembly Facility and Redstone Arsenal. Assembled but unfueled FTF liquid propellant targets may also require short-term storage for up to one year at the Lockheed Martin Target Missile Systems facility for the reasons discussed above.

- **Transportation of FTF Targets to Launch/Staging Locations.** The transport of FTF targets from the Courtland and TMS Huntsville facilities to Redstone Arsenal would involve 43 miles of truck transport using five trailer trucks for all support and test equipment, the CT, and CE, and five security vehicles per target shipment; from Redstone to the launch/staging locations would involve the use of 6 C-17 and 1 C-5 (as the maximum transportation requirements) per target shipment. The takeoff and landing events associated with the flights from Redstone Army Airfield to the destination locations have been considered in terms of aircraft emissions, total number of flights and pre-launch staging activities at staging locations. (Note that in the case of RTS the target would be taken from the airport to the launch site on Meck Island via barge (29 kilometers [18 miles]).

- **Pre-launch, Launch, and Post-launch Activities for FTF Targets from Land, Air, and Sea Platforms.** These activities have been grouped and considered by launch platform.

Land Launch - ***Pre-launch*** activities for the launch of ***solid propellant targets*** would include short term storage at the launch location, pad setup, final integration/functional testing/target propellant loading, range clearing and other safety requirements. Additionally, pre-launch activities for KLC, Vandenberg AFB, USAKA/RTS, and Wake Island would include minor site modification or construction activities. Short-term storage of the target would occur as necessary at the launch location. A fully assembled target could be stored for up to one year in an appropriate storage facility as the result of mission or launch delays. Pad setup would include assembly of the launch stand and anchoring the launch stand to the pad. The FTF target would be roll transferred to the CE. Once the target is on the CE, it would be prepared for post transportation confidence tests and system level testing. Launches of the SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 would require the fueling of the ACM ACS with a small quantity of hydrazine for the attitude control system. The hydrazine loading would be accomplished using specific propellant loading equipment and SOPs developed for those activities. The target would then be erected on the launch pad. ***Pre-launch*** activities for ***liquid propellant targets*** would include target propellant loading. The liquid propellant targets would be loaded with propellant 8 to 10 days before launch. The initiator propellant would be transferred to the target approximately 15 minutes before launch.

Launch activities for both liquid and solid propellant targets would include the launch and flight of the target, beginning with first stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept (some missions), and debris generation.

Following vehicle liftoff from the launch pad, the pad would be checked for safe access. ***Post-launch*** activities for solid and liquid propellant targets would include inspection of the launch pad facilities, launch platform, and equipment for damage, as well as general cleanup and performance of maintenance and repairs necessary to accommodate the next launch cycle. Post-launch refurbishment could include the replacement of cables and other damaged components, and the painting of components (e.g., launch vehicle suspension system) for corrosion control and cleanup of any residues that would be disposed of as hazardous waste. MDA has no plans or requirements to recover FTF targets or payloads. If a recovery is required due to a mission failure investigation it would be performed on an emergency basis. If a malfunction occurs during the target's flight, the Range Safety Officer might terminate the flight, resulting in debris being deposited along the flight path. At WSMR and Fort Wingate there could be debris recovery efforts that would involve equipment already in place and in use at the range.

Sea Launch - ***Pre-launch*** activities for sea launch would include preparation of the MLP launch stand for arrival of the target, setting the target on the launch stand, and transporting the MLP to the test event location. Short-term storage of the target would occur as necessary at the staging location. A fully assembled target could be stored for up to one year in an appropriate storage facility as the result of mission or launch delay. Most of the pre-launch activities would occur at the Pearl Harbor staging location. The propellants and FTF target would be loaded onto the MLP at Pearl Harbor. Propellant loading of liquid propellant targets would take place on the MLP in route to the launch location.

Launch activities for both liquid and solid propellant targets would include the launch and flight of the target, beginning with first stage motor ignition, nominal ascent and mission events, possible abort, target scene presentation, intercept (some missions), and debris generation.

Post-launch activities for sea launches would involve a visual inspection of the deck area and collection of any debris from the deck. The fuel burned during the buildup of thrust and lift-off could scorch coatings and insulation materials on the MLP and leave carbon residues on the deck. Debris including any wastewater generated from cleaning the deck would be disposed of in accordance with applicable regulations including the International Convention for the Prevention of Pollution or brought back to port for disposal. MDA has no plans or requirements to recover FTF targets or payloads. If a recovery is required due to a mission failure investigation, it would be performed on an emergency basis. If a malfunction occurs during the target's flight, the Range Safety Officer might terminate the flight, resulting in debris being deposited along the flight path. The MLP would be transported from the test event location back to its berthing location as appropriate.

Air Launch - ***Pre-launch*** staging activities for air launches of FTF solid propellant targets could include short term storage at the staging location, securing the target to the pallet, final checkout and loading the ACM ACS of the SR19, Castor IVB, SR19/SR19, and LV-2 with a small amount of hydrazine. These activities are normal industrial operations that occur daily at the staging locations. The hydrazine loading would be accomplished using specific propellant loading equipment and SOPs developed for those activities.

Launch activities for air launches of FTF targets would begin when the launch aircraft reaches the designated launch location over the BOA. At the designated altitude, the aircraft aft door would be opened and the palletized FTF solid propellant target vehicle would be extracted from the aircraft. After descending by parachute to an altitude of approximately 6,096 meters (20,000 feet) above mean sea level, explosive cutters would sever the straps holding the missile to the pallet, allowing the target to fall away from the pallet and parachutes, which would remain connected and continue their slowed descent sinking into the ocean. Following its separation from the pallet, the first stage rocket motor would ignite, at which time powered flight begins. On the missile's flight trajectory, the rocket motors would burn out and separate from the target and fall into the ocean. MDA has no plans to recover any hardware.

Post-launch activities for air launches would involve the return of the C-17 to the air launch staging location. Any FTF equipment would be removed from the aircraft. Debris including any wastewater generated from any cleaning of the aircraft interior would be disposed of in accordance with applicable regulations. MDA has no plans or requirements to recover FTF targets or payloads from the BOA. If a recovery is required due to a mission failure investigation, it would be performed on an emergency basis. If a malfunction occurs during the target's flight, the Range Safety Officer might terminate the flight, resulting in debris being deposited along the flight path.

All activities associated with the FTF Program identified above were addressed in one of three ways. They were either 1) dismissed because they were not expected to create any impacts to any resource areas; 2) not analyzed in this EA because they had been previously analyzed in NEPA documentation either tiered from or incorporated by reference; or 3) analyzed in this EA.

Activities Dismissed from Analysis

The ***development*** and ***preparation*** activities related to the FTF target family were dismissed from analysis because these activities would occur at facilities that currently routinely perform these types of activities and the development would not introduce any activities different from those already conducted at these facilities. The ***storage*** of liquid propellant FTF targets prior to shipment to launch/staging locations would not have any environmental consequences because these vehicles would not be loaded with propellant until they arrive at the launch location and prior to launch.

Activities Previously Analyzed

The ***assembly, integration*** and ***testing*** of solid propellant targets was analyzed in the Courtland Target Assembly Facility EA. (MDA, 2006) The Courtland EA concluded that there would be no significant impacts to air quality from operational activities at the Courtland facility. Potential soil contamination from spills or leaks would be contained and, therefore, would not significantly impact geology and soil. Hazardous waste would remain within the regulatory limit of a small quantity generator. To prevent impacts on water resources, all temporary storage tanks or sheds that contain hazardous materials or petroleum-based products would have secondary containment features such as berms or dikes to contain spilled contents, and would have appropriate spill responses for the materials present. Health and safety impacts associated with the Courtland Facility include moving the booster for assembly. No exposure impacts are expected during the proposed operations. No significant impacts on land use, noise levels, socioeconomics and environmental justice, or water resources were expected. The Courtland EA concluded that operational activities would have no impact on biological resources, cultural resources, or visual resources.

The final ***assembly*** and ***integration*** of the front section of the liquid propellant target has been analyzed in the WSMR LPT EA. (MDA, 2002a) The WSMR LPT EA concluded that propellant storage and transportation of the missiles and associated equipment would not impact air quality. Minimal health and safety impacts from the transportation of liquid propellant targets and assembly of missile components were expected. The WSMR LPT EA concluded that assembly and integration of liquid propellant targets would have no impact on airspace, biological resources, cultural resources, geology and soils, hazardous materials and waste, land use, noise, transportation, and water resources. The final assembly and integration of the front section of liquid propellant targets at the Lockheed Martin Target Missile Systems facility would be expected to have similar and no greater effects than those described in the WSMR LPT EA.

The ***storage*** of solid propellant targets at the Courtland Facility has been analyzed in the Courtland Target Assembly Facility EA. (MDA, 2006) HVAC systems at all proposed buildings would ensure the proper storage temperatures and humidity for the boosters, therefore, no significant impacts to health and safety are expected from booster storage. As stated above liquid propellant targets would be stored unfueled prior to shipment for launch and would be launched once loaded with propellant within 8 to 10 days.

General pre-launch, launch, and post-launch impacts of solid and liquid propellant missiles have been analyzed in the BMDS PEIS. (MDA, 2007a) The BMDS PEIS analyzes launch activities from air, land, and sea launch environments for worldwide biomes that include the locations proposed for FTF activities. The analysis in this EA is tiered from the BMDS PEIS. Further, many of the pre-launch, launch, and post-launch activities that are part of the proposed action have been previously analyzed in existing NEPA documentation as discussed below.

Land Launches

Pre-launch activities. Pre-launch activities for solid propellant targets were analyzed in the BMDS PEIS (MDA, 2007a). The BMDS PEIS concluded that pre-launch activities would have no impact on air quality, air space, biological resources, geology and soils, hazardous materials and waste, health and safety and noise. Impacts on local traffic from pre-launch target and support equipment shipments were not expected to be significant. Adherence to existing policies and procedures would minimize impacts on water resources.

Pre-launch activities for liquid propellant targets were analyzed in the WSMR, New Mexico LPT EA (MDA, 2002a). In the WSMR New Mexico LPT EA, pre-launch fueling operations were found to have no significant impact on air quality, hazardous materials and waste, and health and safety. The WSMR EA indicated that only very small amounts (approximately 10 grams [0.4 ounce]) of oxidizer vapors would be released to the atmosphere during the oxidizer transfer operation. A negligible amount of fuel vapors would also be released into the atmosphere during fuel transfers. The WSMR EA concluded that normal propellant loading operations would not impact air quality. No impacts were anticipated on airspace, biological resources, cultural resources, geology and soils, land use, noise, infrastructure, or water resources from pre-launch activities associated with liquid propellant targets.

General pre-launch site preparation and construction activities for land-based launches were addressed in the BMDS PEIS and this analysis will be tiered from as appropriate for the specific sites at which these activities are proposed to occur for FTF target launches (i.e., KLC, Vandenberg AFB, USAKA/RTS, and Wake Island).

Launch activities. The launch of liquid and solid propellant targets from land-based platforms has been addressed in numerous NEPA analyses. Exhibit 4-1 provides an overview of the previous NEPA analyses addressing launches of solid and liquid propellant targets from the seven proposed FTF land launch locations. This overview focuses on the largest liquid and solid propellant target launched from each location and associated NEPA documentation. Additionally, the Exhibit displays the FTF targets proposed for launch from each land location.

Exhibit 4-1. Overview of FTF Targets and Existing NEPA Analyses

Launch or Staging Location	FTF Targets Proposed for Launch	Previous NEPA Analysis for Liquid Propellant Target Launch	Previous NEPA Analysis for Solid Propellant Target Launch
Fort Wingate	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73. Largest solid propellant target is SR19/SR19 (12,476 kg (27,505 lb)	N/A	Launch of representative 2-stage target missile (M57A-1/M56A-1) with total propellant mass 6,370 kg (14,020 lb) TMD ETR EIS
Vandenberg AFB	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2, LV-3. Largest solid propellant target is LV-3 (43,258 kg (95,367 lb)	Launch of single-stage liquid fueled missile requiring ~ 907 kg (2,000 lb) of main fuel, 2,930 kg (6,456 lb) of oxidizer and 27 kg (60 lb) of initiator fuel analyzed in LPM Site Preparation and Launch EA	Launch of the 4-stage Peacekeeper target with total propellant mass 76,930 kg (169,250 lb) analyzed in GMD ETR EIS
WSMR	LPT; SR19. Largest solid propellant target is SR19 (6,238 kg (13,752 lb)	Launch of representative liquid propellant target requiring ~ 825 kg (1,815 lb) of main fuel, 2,920 kg (6,425 lb) of oxidizer and 30 kg (66 lb) of initiator fuel analyzed in the WSMR LPT EA	Launch of boosters including SR19-AJ-1 with total propellant mass 6,235 kg (13,750 lb) analyzed in the WSMR EIS
KLC	SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2, LV-3. Largest solid propellant target is LV-3 (43,258 kg (95,367 lb)	N/A – KLC's launch license from the FAA does not permit the launch of liquid propellant missiles	Launch of four-stage Peacekeeper target with total propellant mass 76,930 kg (169,250 lb) analyzed in the GMD ETR EIS

Launch or Staging Location	FTF Targets Proposed for Launch	Previous NEPA Analysis for Liquid Propellant Target Launch	Previous NEPA Analysis for Solid Propellant Target Launch
PMRF	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73. Largest solid propellant target is SR19/SR19 (12,476 kg (27,505 lb)	Launch of Lance targets requiring ~ 170 kg (375 lb) of main fuel and 499 kg (1,100 lb) of oxidizer, and of Liquid Fueled Missiles requiring 825 kg (1,815 lb) of main fuel, 2,920 kg (6,425 lb) of oxidizer, and 30 kg (66 lb) of initiator analyzed in the PMRF Enhanced Capability EIS	Launch of PAC-2, PAC-3 and THAAD analyzed in the PMRF Enhanced Capability EIS
USAKA/RTS	SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2, LV-3. Largest solid propellant target is LV-3 (43,258 kg (95,367 lb)	N/A	Launch of GBI interceptor with propellant mass 20,500 kg (45,195 lb) from USAKA/RTS analyzed in the GMD ETR EIS
Wake Island	LPT; SR19, SR19/M57, SR19/SR19, Castor IVB, SR19/SR73, LV-2. Largest solid propellant target is LV-2 (25,591 kg (56,418 lb)	Launch of generic liquid propellant target requiring ~ 3,400 kg (7,500 lb) of main fuel, 12,000 kg (26,500 lb) of oxidizer and 120 kg (270 lb) of initiator fuel analyzed in the Wake Island SEA	Launch of Castor IVB 1st stage motor and M57A-1 2nd stage motor with total propellant mass 13,625 kg (29,975 lb) analyzed in the Wake Island EA

Post-launch activities. The impacts of post-launch activities for the FTF targets are anticipated to be the same post-launch activities that already occur for ongoing missiles launches and that have been previously analyzed in programmatic and site-specific environmental documents.

Sea Launches

Pre-launch activities. The use of Pearl Harbor as an ordnance loading location for the MLP was considered in the MLP EA. (MDA, 2004a) The MLP EA concluded that no unusual or adverse impacts would be expected at Pearl Harbor because similar operations routinely occur at Pearl Harbor. The MLP EA also analyzed pre-launch activities related to the launch of solid and liquid propellant missiles including transportation of the MLP from the ordnance loading point to the test event location, propellant loading of liquid propellant missiles at the ordnance loading point or on the MLP, adding fins to the missile, and elevating the missile to the appropriate launch angle. A summary of pre-launch impacts is presented below.

Fueling procedures would specify any meteorological condition during which fueling would not be permitted. Therefore, the MLP EA concluded that normal fueling operations would not impact air quality. The quantity of hazardous materials used and hazardous waste generated is not expected to significantly impact the generator status or current hazardous management and waste disposal practices at Pearl Harbor. Tests would be conducted in areas that would minimize the impacts to marine transportation. Health and safety SOPs would be developed and implemented for missile fueling onboard the MLP. Consequently, no adverse impacts to public health and safety would be expected from pre-launch activities for any missiles on the MLP. Pre-launch activities would not be expected to pose a significant noise impact on the surrounding environment. Towing the MLP would result in minor releases of diesel fuel to water from the tow vessel. Additionally, the release of liquid propellants during fueling could result in limited emissions of nitric acid through the release of inhibited red fuming nitric acid (IRFNA). However, the low levels of the emissions and the natural buffering capacity of the sea water combined with the strong ocean current would neutralize the reaction in a relatively short period of time. No significant impacts on airspace, biological resources, geology and soils, or transportation would be expected from pre-launch activities.

Launch. The MLP EA analyzed the launch of solid and liquid propellant targets from the BOA. Emissions from launches would not be expected to adversely affect air quality in the BOA. CAA permitting requirements do not apply to the BOA and therefore would not be affected by the proposed test events. Because the airspace in the Pacific BOA is not heavily used, impacts to controlled and uncontrolled airspace would be minimal. No significant impacts to over-water airways and jet routes would be expected because the MLP would be positioned to avoid the en route and jet routes that cross the North Pacific Ocean. The potential for biological impacts to plankton and nekton exists when FTF targets fall into the ocean. The density of marine species, including marine mammals generally decreases, and the corresponding probability of impact from activities onboard the MLP decreases, as the distance from the shore increases. No significant impacts would be expected to biological resources from noise associated with missile launches from the MLP. No impacts to geology and soils, hazardous materials and waste, or noise impacts to humans or marine mammals would be expected from any missile test event onboard the MLP. Launch activities from the MLP would not take place close to any landmass; therefore members of the public would not be exposed to any hazards. Safety procedures would be employed to determine that the impact areas are clear of surface vessels to ensure that no impact to ocean transportation would occur. No impacts would be expected on water resources from missile launches.

Post-launch. The MLP EA analyzed the impacts of post-launch activities including a visual inspection of the desk area, collection any debris on the deck, and return of the MLP to the ordnance loading port or home port as appropriate. Transporting the MLP from the test event location in the BOA would result in a small amount of localized vehicle emissions. However, the winds in the BOA would disperse any minor emission amounts. No impacts to airspace, geology and soils, hazardous materials and waste, health and safety, or noise would be expected from post-launch activities. The natural buffering capacity of sea water and the strong currents would neutralize any released liquid propellants. Therefore, impacts to biological resources would be minimal. Post-launch activities would not be expected to impact transportation. Although washing the deck with freshwater following a launch may result in temporary localized decrease in the salinity of the ocean water near the MLP, post-launch activities would not be expected to adversely impact water quality.

Air Launches

Pre-launch. The Long Range Air Target Launch EA discusses pre-launch staging activities at PMRF including final system checks, storage of the target for 7 to 10 days, attaching the target to the pallet, and loading of the target onto a C-17 aircraft. (MDA, 2002b) Based on the limited pre-launch activities that would occur at PMRF, the only resource area analyzed in the LRALT EA was health and safety. The LRALT EA concluded that preflight preparations involving aircraft support, and missile system final checks, represent routine activities at PMRF. The refueling of one aircraft and brief handling of one LRALT flight test missile would not cause a significant increase in current operations or risks to health and safety. Because the activities at all staging locations are identical, no impacts to public or occupational health and safety would be expected at Elmendorf AFB, Alaska; Misawa AB, Japan; YPG, Yuma, Arizona; and Hill AFB, Utah.

Launch. The potential environmental consequences of launching an SR19/SR19 target from a C-17 aircraft over the Pacific BOA were analyzed in the LRALT EA. (MDA, 2002b) The LRALT EA concluded that the combined release of hydrogen chloride (HCl), aluminum oxide (Al_2O_3), NO_X and Halon 2402 emissions in the upper atmosphere due to a single LRALT flight test would be insignificant because of the rapid dispersion expected for such small quantities of these emissions. Therefore, they would not have a significant impact on stratospheric ozone. Impacts to biological resources, especially marine mammals and sea turtles, could occur from acoustic and non-acoustic effects. The LRALT EA concluded that the proposed LRALT flight test would have no discernable or measurable effect on the ocean's overall physical and chemical properties, and thus would have no impacts to the overall marine biology of the BOA ROI. Impacts to airspace were determined to be minimal. The LRALT EA determined that launch of an SR19/SR19 target would cause no adverse impacts on public health or safety in the BOA.

Post-launch. The impacts of post-launch activities for the FTF targets are anticipated to be the same post-launch activities that already occur for ongoing missiles launches and that have been previously analyzed in programmatic and site-specific environmental documents.

Activities Analyzed in this EA

The activities that have not been addressed previously include the transport of the targets after assembly, integration and testing to Redstone as the initial point of departure for all FTF targets to specific launch and staging locations depending on the requirements of the target mission.

As discussed in Section 2.7.5.1, four sites (i.e., KLC, Vandenberg AFB, USAKA/RTS, and Wake Island) would require pre-launch site preparation and construction activities specifically to accommodate the FTF Program launches. Pre-launch construction and preparation activities for the launch of missiles have been considered in the BMDS PEIS for worldwide biomes encompassing the four sites mentioned above. The analysis in this EA will be tiered from the analysis in the PEIS and applied to the specific sites as appropriate.

Additionally, this EA will consider site-specific launch impacts of FTF targets that have not been launched before at specific locations – either new booster combinations (SR19 SR73) or "new" targets[5] (LV-2 and LV-3). These analyses will use previous analyses to the extent possible to discuss impacts. This EA will also consider any other site-specific pre-launch, launch, and post-launch activities that have not been considered in previous analyses, as appropriate.

Section 4.3 describes the impacts of transporting the FTF targets to Redstone Arsenal over the road and also the roundtrip flights transporting each target to launch/staging

[5] The LV-2 and LV-3 FTF targets are new combinations of existing boosters using hydrazine in the ACS.

locations. The takeoffs and landings of the target shipments at the receiving destinations will be addressed for each launch/staging location. Sections 4.4 through 4.15 of this EA are organized by site and present the analysis of environmental impacts associated with those proposed action activities where specific relevant resource areas have not been previously analyzed. Section 4.16 presents cumulative impacts associated with the proposed action and alternatives.

4.3 Transportation of FTF Targets to/from Redstone Arsenal

As described in Section 2.6, it was conservatively estimated that up to 20 roundtrip target shipments would originate from the Courtland Target Facility in Courtland, Lawrence County, Alabama (for solid propellant targets) or from the Lockheed Martin Target Missile Systems facility (for liquid-propellant targets) and travel by ground to Redstone Arsenal in Huntsville, Madison County, Alabama. Up to a maximum of 12 trucks would be required to move the targets 69 kilometers (43 miles)[6] over public roads to Redstone Arsenal. These additional road trips could increase the annual emissions of VOCs, CO, NO_X, PM_{10}, and SO_2 in Lawrence and Madison Counties. Exhibit 4-2 presents the total estimated emissions associated with up to 20 targets roundtrips per year to Redstone Arsenal.

Exhibit 4-2. Ground Transportation Emissions Redstone Arsenal

Pollutant	Emissions, grams per mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year[2], metric tons (tons)
VOC	1.100	0.00009 (0.0001)	0.023 (0.025)
CO	6.461	0.00056 (0.00061)	0.13 (0.14)
NO_X	15.434	0.0013 (0.0014)	0.31 (0.34)
PM_{10}	0.316	0.000027 (0.000030)	0.0065 (0.0072)
SO_2	0.346	0.000030 (0.000033)	0.0072 (0.0079)

1 The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the trucks involved in the transport would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to total 86 miles.

2 A maximum of 12 trucks were assumed to travel 20 times per year to accommodate 20 FTF target shipments.

Once at the Redstone Army Airfield, each shipment would require up to seven C-17 and one C-5 aircraft. These additional flights could increase the annual emissions of hydrocarbons (HC), CO, NO_X, and SO_2 at Redstone Arsenal. MDA reviewed the

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[6] Road transport trips of 69 kilometers (43 miles) would be required to move the solid propellant targets from the Courtland Single Integration Facility to Redstone Arsenal for loading on a C-17 or C-5 for transport to the launch location. Because the distance required for shipping LPTs from the Lockheed Martin Target Missile Systems facility would be less than for solid propellant targets, this analysis conservatively assumes that all targets would be shipped 69 kilometers (43 miles) over the road.

emissions associated with a worst-case scenario of one shipment requiring the maximum of six C-17 and one C-5 aircraft to transport the target and all associated support equipment. The flight phase activities associated with the transport planes that would result in emissions include approach, idling, takeoff, and climb-out. Exhibit 4-3 presents the emissions per landing/takeoff cycle for the C-17 and C-5 aircraft.

Exhibit 4-3. Aircraft Emissions for the C-17 and C-5

	Emissions, metric tons (tons)			
	HC	**CO**	**NO_X**	**SO_2**
C-17 Emissions per Landing/Takeoff Cycle	0.003 (0.003)	0.033 (0.036)	0.053 (0.058)	0.002 (0.002)
C-5 Emissions Per Landing/Takeoff Cycle	0.066 (0.073)	0.114 (0.126)	0.069 (0.076)	0.002 (0.002)

Source: EPA, 1992 and ICAO, 2007

For each target shipment, each transport plane would be involved in one landing/takeoff cycle. Exhibit 4-4 presents the total emissions per target shipment.

Exhibit 4-4. Total C-17 and C-5 Emissions per FTF Target Shipment, metric tons (tons)

Emissions	Seven C-17 Aircraft	One C-5 Aircraft	Total Emissions for Single FTF Target Shipment
HC	0.021 (0.023)	0.066 (0.073)	**0.087 (0.096)**
CO	0.231 (0.255)	0.114 (0.126)	**0.345 (0.381)**
NO_X	0.371 (0.409)	0.069 (0.076)	**0.440 (0.485)**
SO_2	0.014 (0.015)	0.002 (0.002)	**0.016 (0.017)**

Assuming the maximum of 20 FTF target shipments flew from and returned to Redstone Arsenal each year, the maximum annual emissions at Redstone Army Airfield from the increased aircraft transport would be 1.74 metric tons (1.92 tons) of HC; 6.90 metric tons (7.60 tons) of CO; 8.80 metric tons (9.70 tons) of NO_X; and 0.32 metric tons (0.35 tons) of SO_2.

Although both Lawrence and Madison Counties are in attainment for all Federal NAAQS, a conservative analysis was performed by comparing the total annual transportation emissions to the *de minimis* annual emission levels for NAAQS non-attainment areas (see Exhibit 4-5). The comparison was performed to determine whether the emissions have the potential to have a negative impact on air quality.

Exhibit 4-5. Comparison of Transportation Emissions to NAAQS *De Minimis* Levels

	Annual Emissions, metric tons (tons)		
	CO	NO_X	SO_2
De minimis level – all non-attainment areas	91 (100)	-	91 (100)
De minimis level – serious non-attainment areas		45 (50)	
Severe non-attainment areas		23 (25)	
Total Truck and Aircraft Emissions	**7.0 (7.1)**	**9.1 (8.8)**	**0.33 (0.31)**

Source: 40 CFR 93.153(b)

All estimated emissions that would result from truck and air transportation activities in Lawrence and Madison Counties are less than the *de minimis* levels. Therefore, the emissions of all criteria air pollutants and precursor pollutants associated with the transportation of FTF targets to Redstone Arsenal and then onto the launch/staging locations would not result in a significant impact on air quality in the region.

If the maximum of 20 FTF target shipments occurred from the Redstone Arsenal Army Airfield, those shipments would add up to 140 additional C-17 takeoffs, 140 additional C-17 landings, 20 additional C-5 takeoffs, and 20 additional C-5 landings to the airfield per year (a total of 320 additional takeoffs and landings per year). Currently, Redstone Army Airfield has an average of 88 aircraft movements per day, 22,101 movements per year (a movement is one takeoff, one landing, or one overflight). The addition of a maximum 320 movements per year to the airfield's current operations tempo would result in an increase of only 1.4% over current operating conditions. This would not be considered a significant increase in operations.

4.4 Kodiak Launch Complex, Alaska

As described in Section 2.7.5.1, pre-launch preparation and construction activities include installation of a lightning protection system, construction of a new target launch pad, and installation of metal tie-downs to support the CE. Section 2.7.2.1 describes pre-launch activities for land launch, including site-preparation and construction, preparation of the launch site for arrival of the target, short term storage of the target (if necessary), and setting the target on the launch stand. Land launch activities are detailed in Section 2.7.3.1 and include launch and flight of the target. Post-launch activities are described in Section 2.7.4.1 and would include clearing debris and refurbishing the launch area as addressed in GMD ETR EIS (MDA, 2003a) and would pose no impacts. Targets launched from KLC would not be recovered; posing no environmental impacts. Only solid propellant targets would be launched from KLC; therefore, there would be no impacts from the launch of liquid propellant targets from KLC.

4.4.1 Proposed Action

4.4.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of FTF targets to KLC could occur from truck and air transport of the target to the launch location.

As described in Section 2.6, a maximum of two roundtrip target shipments per year to and from KLC would occur under the proposed action. Two roundtrip shipments would increase the number of landings and takeoffs at Kodiak Airport by up to a maximum of 32 per year. Using the air transport analysis in Exhibit 4-4, the total emissions from two landing/takeoff cycles for up to seven C-17 and one C-5 aircraft for two target shipments can be estimated. Assuming that two FTF launches occurred at KLC each year, the maximum annual emissions at Kodiak Airport from the increased aircraft transport would be 0.17 metric tons (0.19 tons) of HC; 0.69 metric tons (0.76 tons) of CO; 0.88 metric tons (0.97 tons) of NO_X; and 0.032 metric tons (0.035 tons) of SO_2. All of Kodiak Island (including KLC and Kodiak Airport) is classified as a Class II attainment area. It is part of a larger area that is in attainment with all Federal NAAQS. The total emissions from air transport shipments of FTF targets to and from Kodiak Airport would be below any Federal *de minimis* quantities, therefore the emissions from the additional flights to and from Kodiak Airport would not cause a significant impact on air quality at Kodiak Island.

Once at Kodiak Airport, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel 71 kilometers (44 miles) over local roads to KLC. Exhibit 4-6 presents the total estimated emissions associated with transporting two targets per year to KLC from Kodiak Airport and return.

Exhibit 4-6. Ground Transportation Emissions KLC

Pollutant	Emissions, grams per mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year[2], metric tons (tons)
VOC	1.100	0.0001 (0.0001)	0.002 (0.002)
CO	6.461	0.0006 (0.0007)	0.014 (0.015)
NO_X	15.434	0.001 (0.001)	0.02 (0.02)
PM_{10}	0.316	0.00003 (0.00003)	0.0007 (0.0008)
SO_2	0.346	0.00003 (0.00003)	0.0007 (0.0008)

[1] Emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to total 88 miles.

[2] A maximum of 12 trucks were assumed to travel twice per year to accommodate two FTF target shipments.

As seen in Exhibit 4-6, the estimated emissions from trucks transporting two FTF targets and all support equipment from Kodiak Airport to KLC would be less than the Federal *de* *minimis* NAAQS levels for all pollutants in the region. Therefore, emissions from ground transportation vehicles would not cause significant air quality impacts in the greater Kodiak Island region.

Pre-launch. Impacts on air quality from pre-launch activities at KLC could occur from physical site preparation and construction activities and pad setup activities preparing the target for launch. Expansion of the existing launch pad to support the FTF launch stand and accommodate propellant loading equipment would disturb approximately 0.011 hectare (0.027 acre) of soil. It is projected that construction would take 12 months to complete. Potential impacts include increased PM_{10} from construction-related activities and exhaust emissions (e.g., CO, NO_X, VOCs, PM_{10}, and SO_X) from construction equipment and related vehicles.

The disturbance of 0.011 hectare (0.027 acre) of soil over 9 months[7] would result in 0.27 metric tons (0.30 tons) of fugitive dust emissions, using EPA's estimate of 1.08 metric tons (1.2 tons) of fugitive dust from ground disturbing activities on a monthly basis. (EPA, 1995) However, best management practices would be used to minimize fugitive dust emissions. These practices could include watering exposed soils resulting in an up to 50 percent reduction of overall site fugitive dust emissions. For the purposes of this analysis, it was conservatively assumed that dust control measures would be 50 percent effective and that PM_{10} would comprise 50 percent of the total fugitive dust emissions. Therefore the total estimated PM_{10} emissions from ground-disturbing activities at KLC would be 0.067 metric tons (0.074 tons).

Typical heavy-duty construction equipment, such as bulldozers, graders, dump trucks, cement trucks, cranes, front-end loaders/backhoes, roller, power hand tools, and compactors, would be required during construction. For the purposes of analysis, it was conservatively assumed that the construction vehicles would be active 10 hours per day for the estimated 180 days of construction. The daily emissions from typical construction equipment and vehicles for CO, VOCs, NO_X, SO_X, and PM_{10} are presented in Exhibits 4-7 and 4-8. For the 180 days of construction estimated for KLC, the total emissions for all construction equipment and vehicles would be 11.4 metric tons (12.6 tons) of CO, 1.3 metric tons (1.4 tons) of VOCs, 27.2 metric tons (30.0 tons) of NO_X, 2.6 metric tons (2.9 tons) of SO_X, and 0.74 metric tons (0.82 tons) of PM_{10}. Proper tuning and maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance. The total PM_{10} emissions from all ground-disturbing activities and from all construction-related vehicles and equipment would be 0.81 metric tons (0.88 tons).

[7] Although total construction time would be expected to take 12 months, ground-disturbing activities were assumed to occur during the initial 9 months. Assuming there are four work-weeks per month, and that each work-week consisted of five days, the total number of construction days would be 180.

Exhibit 4-7. Construction Vehicle Emissions KLC

Equipment	Number	Unit Emission Factors (kg/hr)				Emissions (kg/day)			
		CO	VOC	NO_X	SO_X	CO	VOC	NO_X	SO_X
Bulldozer	1	0.81	0.08	1.89	0.16	8.1	0.8	18.9	1.6
Cement Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Compactor	1	0.31	0.06	0.77	0.06	3.1	0.6	7.7	0.6
Motor Grader	1	0.07	0.02	0.32	0.04	0.7	0.2	3.2	0.4
Dump Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Flatbed Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Backhoe	1	0.81	0.08	1.89	0.16	8.1	0.8	18.9	1.6
Clamshell	1	0.81	0.08	1.89	0.16	8.1	0.8	18.9	1.6
Mobile Crane	1	0.31	0.06	0.77	0.06	3.1	0.6	7.7	0.6
Water Tanker Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Total Emissions, kg/day (lb/day)						**63.6 (140.2)**	**7.0 (15.4)**	**150.9 (332.7)**	**14.4 (31.8)**
Total Construction Vehicle Emissions, metric tons (tons)[a]						**11.5 (12.6)**	**1.3 (1.4)**	**27.2 (30.0)**	**2.6 (2.9)**

[a] Assumed 180 days of construction.

Exhibit 4-8. Construction Vehicle PM_{10} Emissions KLC

Equipment	Number	Power	PM_{30} Emission Factor (kg/hr)	Ratio of PM_{10} to PM_{30}	PM_{10} Emission Rate (kg/day)
Bulldozers	1	Diesel	0.075	0.5	0.4
Cement Trucks	1	Diesel	0.116	0.5	0.6
Asphalt Spreader	1	Diesel	0.075	0.5	0.4
Compactors	1	Diesel	0.0632	0.5	0.3
Motor Grader	1	Diesel	0.0277	0.5	0.1
Dump Truck	1	Diesel	0.116	0.5	0.6
Flatbed Truck	1	Diesel	0.116	0.5	0.6
Backhoe	1	Diesel	0.075	0.5	0.4
Clamshell	1	Diesel	0.075	0.5	0.4
Mobile Crane	1	Diesel	0.0632	0.5	0.3
Water Tanker Truck	1	Diesel	0.116	0.5	0.6
Total Daily Emissions, kg/day (lb/day)					**4.1 (9.0)**
Total Construction Vehicle Emissions, metric tons (tons)[a]					**0.74 (0.81)**

[a] Assumed 180 days of construction; 10 hours per day
Source of both Exhibits: *of Air Pollutant Emission Factors* (AP-42), Volume II. Dump trucks, flatbed trucks, cement trucks, and water tanker trucks were classified as off highway trucks; backhoes, clamshells, and bulldozers were classified as wheeled dozers; and mobile cranes and compactors were classified as miscellaneous.

Kodiak Island is in attainment for all Federal NAAQS. The total emissions from ground disturbing activities and from all construction-related vehicles and equipment would be considerably below any Federal *de minimis* levels, and therefore would not be expected to cause exceedances of the NAAQS or Alaska AAQS. Construction would be conducted in accordance with all applicable laws and regulations. While construction would cause a slight increase in some air pollutants, the impact would be both temporary and localized. Once construction ceased, air quality would return to its former level. Therefore the impacts from site preparation and construction activities at KLC would be not significant.

*Launch***.** The largest target proposed to be launched at KLC is the LV-3 with a total propellant mass of 43,258 kilograms (95,367 pounds). The launch of the Peacekeeper missile, with a larger propellant mass, at KLC has been analyzed in the GMD ETR EIS. (MDA, 2003a) Because the LV-3 has a lower propellant mass than the Peacekeeper, the launch of the LV-3 from KLC and would be expected to have similar or fewer impacts than those discussed in the GMD ETR EIS for the Peacekeeper.

The GMD ETR EIS discussed the results of modeling a dual Peacekeeper target at KLC. The results showed that the level of HCl would be below the 1-hour Air Force standard, but would exceed the peak HCl standard for a short duration. The GMD ETR EIS concluded that the nominal launch of a single Peacekeeper target is anticipated to remain within NAAQS, Alaska AAQS, and Air Force standards. Because the LV-3 has less propellant mass than the Peacekeeper, there would be fewer emissions expected from the launch of LV-3 from KLC, and emissions would be expected to be within NAAQS, Alaska AAQS, and Air Force standards.

The air quality impacts of launches from KLC were considered in the KLC EA. (FAA, 1996) This document analyzes the air quality impacts of up to nine launches at KLC per year. Nine launches is the total number of annual launches allowed under the FAA site operator license under which the AADC operates KLC.

The KLC EA concluded that emissions of HCl and Al_2O_3 from launches would slightly degrade local air quality, but impacts would be temporary and would not be expected to be substantial. The KLC EA indicated no significant impacts on air quality as a result of nine annual launches and that impacts would not accumulate with multiple launches. Therefore the proposed action of up to two FTF target launches annually would fall within KLC's operating launch license and overall impacts on regional air quality are not expected to be adverse and would remain within NAAQS and state AAQS.

Post-Launch. Any post-launch refurbishment activities would meet all applicable rules for VOCs. No air emission permits are required for these operations. With the exception of some minor, localized increases in particulate matter from the occasional brushing of blast residues from the launch tube walls, if necessary, and launch stools, no adverse effects on air quality are expected.

The impacts on air quality from post-launch activities resulting in boosters hitting the ocean have been analyzed in the BMDS PEIS. Impacts would be similar to, but less than those impacts for boosters hitting land because the residual liquid propellants would be released into the ocean rather than the air. Solid propellant, if still in the casing, might continue to burn for some time even under water, possibly impacting air quality. (MDA, 2007a) Because FTF targets would also impact the BOA, impacts would be similar to those discussed in the BMDS PEIS, and minimal impacts to air quality would be expected.

4.4.1.2 Air Space

Pre-launch. The pre-launch activities described in Section 2.7.5.1 would have no impact on controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI. Since site preparation activities would not restrict a clear view of runways, helipads, taxiways, or traffic patterns from the airport air traffic control tower, decrease airport capacity or efficiency, affect future visual flight rules or instrument flight rules, or affect the usable length of an existing or planned runway, they would also not constitute an obstruction to air navigation.

Launch. According to the BMDS PEIS, no adverse impacts on airspace are expected from ground launch of solid propellant targets. The use of KLC for flight preparation and testing has been analyzed in the KLC EA. (FAA, 1996) This document concluded that close coordination with the FAA would result in no adverse effects on airspace from missile flight tests. FTF launches would be coordinated with the FAA, per KLC's standard procedures. Therefore, flight preparation and testing associated with the proposed action would not result in adverse affects on airspace.

Post-launch. The debris from FTF boosters would be expected to fall into the ocean, and MDA would not recover the debris. Therefore, helicopters and other equipment would not be used, and no impacts on airspace would be expected.

4.4.1.3 Biological Resources

Pre-launch. Potential impacts on biological resources could occur as the result of ground disturbing activities and noise during construction of a new target launch pad. The installation of a lightning protection system and metal tie downs to support the CE would not result in significant impacts on biological resources because these activities would occur within the footprint of the launch pad, requiring little to no additional ground disturbance.

Site preparation and construction of the new target launch pad would occur mainly in upland areas of hairgrass-mixed forb meadow, one of the predominant vegetation types at KLC. (MDA, 2003a) No new construction lay down areas would be created under the proposed action; previously disturbed staging areas for construction equipment would be used. Given the dimensions of the proposed launch pad, approximately 0.011 hectare (0.027 acre) of vegetation would be lost under the proposed action. This amount represents only a small portion of the total vegetation available within KLC boundaries and the adjacent region and would not result in significant impacts. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC. Therefore, there would be no impacts on listed plant species.

Wildlife impacts from ground disturbance and construction noise could include habitat loss, wildlife displacement, increased stress, and disruption of daily or seasonal behavior. Habitat loss would not be a significant impact because hairgrass-mixed forb meadow is a common habitat type at KLC and within the surrounding region. The combination of increased noise levels and human activity would likely displace some small mammals and birds that forage, feed, nest, or have dens in proximity to proposed construction areas. However, sufficient foraging and feeding habitat occurs in adjacent areas to accommodate potentially displaced wildlife. Disturbance from equipment noise and temporary increase in personnel would be brief and would not be expected to have a significant adverse effect on resident wildlife species or migratory bird populations.

The closest federally endangered species habitat is the haul out area for the Steller sea lion (*Eumetopias jubatus*), which is approximately 5 kilometers (3 miles) away on Ugak Island. This habitat would not be affected by ground disturbance and construction noise. Federally threatened Steller's eiders (*Polysticta stelleri*) and endangered short-tailed albatross (*Phoebastria albatrus*) also do not occur within close range of the proposed construction site and are not anticipated to be adversely affected by ground disturbance or construction noise.

Launch. Because FTF target launches would be relatively infrequent events at KLC, disturbance to wildlife would be brief and would not be expected to have a lasting impact nor a measurable negative effect on wildlife. Low-level short term exposure to HCl or Al_2O_3, as would be the case in booster launches, would not cause significant damage to vegetation or wildlife. (MDA, 2007a)

Additionally, the GMD ETR EIS analyzed biological impacts of target missile launch at KLC. (MDA, 2003) The GMD ETR EIS determined that normal launch activities are not expected to significantly impact vegetation. No federally listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC. As stated in the GMD ETR EIS, disturbance to wildlife from single launches would be brief, and target launches would not be expected to have a lasting impact nor a measurable negative effect on migratory bird populations. According to the GMD ETR EIS, no evidence has indicated that serious injuries to wildlife have resulted from prior launches, and no long-term adverse effects are anticipated. The National Marine Fisheries Service has concurred with the U.S. Air Force's opinion that predicted launch and overflight noise would have no significant impact on marine mammals, including the Steller sea lion (*Eumetopias jubatus*). Breeding and nesting of federally threatened Steller's eiders (*Polysticta stelleri*) are not anticipated to be impacted by the proposed action. Because the actions proposed in this EA are substantially the same as those discussed in the GMD ETR EIS, the analysis presented in the GMD ETR EIS is considered substantially valid for the proposed action in this EA. The proposed action would not be expected to significantly impact wildlife, plant populations, or listed species.

Post-launch. The intermittent movement of trucks and any repair/clean-up/waste-handling equipment would not produce substantial levels of noise, and vehicles normally would remain on paved or gravel areas. Thus, the limited actions associated with post-launch operations would have no adverse effects on local vegetation or wildlife, including threatened and endangered species, and critical and other environmentally sensitive habitats.

The biological impacts of post-launch activities resulting in motors and boosters hitting the ocean have been analyzed in the BMDS PEIS. Expended motors and boosters hitting the ocean surface would impart a considerable amount of kinetic energy to the ocean water upon impact. For example, interceptors would hit the water with speeds of 91 to 914 meters (300 to 3,000 feet) per second. The shock wave from their impact with the water would be similar to that produced by explosives. Depending on the water depth, strong waves from the impact may detach kelp strands from the sea floor. During successful missions, boosters would impact in deep open ocean waters. At close ranges, injuries to marine mammal internal organs and tissues would likely result. However, the density of marine species including marine mammals generally decreases, and the corresponding probability of impact decreases, as the distance from the shore increases. Injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 (6 in 10,000) marine mammals exposed per year). (MDA, 2007a) Due to the infrequency of proposed FTF launches, and the low probability of marine mammal injury, the proposed action would not be expected to significantly impact marine mammals.

The parts of solid rocket motor propellant expelled from a destroyed or exploded rocket motor that fall into the ocean would most likely sink to the ocean floor at depths of thousands of meters. At such depths, the propellant parts would be located away from feeding marine mammals. (MDA, 2007a) Therefore, marine animals would not be impacted from ingesting the solid propellant associated with FTF targets.

4.4.1.4 Cultural Resources

Pre-launch. The 1994 survey of the KLC area by the Alaska State Office of History and Archaeology showed no signs of archaeological resources or traditional Native American resources. (MDA, 2003a) There are no structures in the KLC area that are listed or eligible for listing on the National Register in the upland areas proposed for site preparation and construction activities. No construction activities or infrastructure modifications are expected to have an effect on any historic properties. Overall, no adverse impacts to cultural resources are anticipated. Should cultural resources be found during the course of site preparation and construction activity, all activities would cease in the area and the proper authorities would be notified.

Launch. As discussed in the GMD ETR EIS, the only potential impacts to cultural resources would be as a result of debris generated by a test failure. According to the GMD ETR EIS, the possibility of this occurring is extremely remote. In addition, there are no known cultural resources at KLC. Therefore, no adverse impacts on cultural resources are anticipated.

Post-launch. Because of the limited activities associated with post-launch operations, no additional ground disturbance or facility modification would occur. However, because personnel would be on site during cleanup and site maintenance, the potential for unauthorized artifact collection still exists. Personnel would be reminded of the sensitivity of cultural resources and the issues of inadvertently damaging or destroying such resources. Thus, no impacts on cultural resources are expected to occur.

4.4.1.5 Geology and Soils

Pre-launch. Potential impacts to geology and soils would consist of soil and ground disturbing activities and the potential for leaks and spills associated with the proposed action. There are no geologic features present at KLC that would be impacted by site preparation and construction activities under the proposed action. Information bearing on seismic design and construction standards and surface faulting potential would be considered by the design engineer in making final siting and design determinations, which would minimize potential impacts.

Proposed construction activities (i.e., new target launch pad) would result in minimal short- and long-term impacts due to soil disturbance. The short-term impacts would include the potential for increased erosion and siltation during construction, while the long-term soil impacts would include compaction and mixing of soil horizons. Soils exposed during construction would be temporarily susceptible to increased erosion caused by wind or rain, but any such erosion would be very minor and short lived. Disturbed areas would be controlled to the extent practicable to minimize erosion and sediment runoff. Best management practices, such as silt fences, hay bales, temporary vegetation seeding, and erosion control blankets would be used on all unpaved surfaces that would be disturbed by construction to minimize erosion and siltation of nearby water bodies.

There is potential for soil contamination from spills or leaks from construction equipment, but any impacts would be temporary and localized. Large spills or leaks would be handled according to standard spill response protocol, which includes delineating the extent of the contamination and removing it. Therefore, any potential soil contamination impacts would be contained and would not be significant.

Launch. The Saltry peat and Ugak silt loam soils characteristic of the KLC valleys may increase in acidity as a function the addition of hydrochloric acid formed by the interaction of HCl vapor with water. Because only two FTF target launches are anticipated per year, the addition of HCl to the environment would be minor; therefore, no significant accumulation of hydrochloric acid would be expected. No significant impacts on geology and soil would be expected from the launch of FTF targets.

Post-launch. No impacts on geology and soils would be expected from debris falling into the ocean due to the depth of the ocean where debris would impact. Inert pieces of debris would be deposited in the ocean and would consist of aluminum, steel, graphite composite, plastic, ceramic, and rubber. These materials would likely sink to the ocean floor; however, they would be unlikely to impact geology and soils in ocean areas.

4.4.1.6 Hazardous Materials and Waste

Pre-launch. The types of hazardous materials used and waste generated during pre-launch activities would be similar to those currently used and generated at KLC. The FTF targets would be shipped to KLC as finished products and only require final assembly on site. The hazardous materials contained within the targets include solid rocket propellant. However, launches of the SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 targets would require the fueling of the ACM ACS with a small quantity of hydrazine for the attitude control system. The hydrazine loading would be accomplished using specific propellant loading equipment and SOPs developed for those activities. Therefore, no adverse impacts would be expected from pre-launch activities for solid propellant boosters.

Launch. The BMDS PEIS addresses impacts from launches of solid propellant targets. Launches would potentially increase the hazardous wastes generated at KLC; however, this increase would not overburden KLC’s hazardous waste management program, and only minimal impacts would be expected. During a launch, there would be no hazardous waste impacts from the launch/flight of FTF targets.

The GMD ETR EIS analyzed the hazardous materials and wastes associated with solid propellant target launch from KLC. The handling and use of hazardous and toxic materials at the launch site during and between launch operations would be limited. Small amounts of potentially hazardous and non-hazardous wastes are expected to be generated during launch operations. Wastes would be segregated as nonhazardous, hazardous, and possibly special wastes for collection and disposal in accordance with applicable state and Federal requirements. Hazardous waste would be containerized and properly disposed of by individual contractors in accordance with AAC, Title 18 - Environmental Conservation, Chapter 16 and KLC requirements. Only licensed hazardous waste transporters would transport hazardous wastes offsite. No permitted hazardous waste treatment or disposal facilities exist on Kodiak Island; therefore, all hazardous waste would be transferred by licensed hazardous waste transporters to the mainland for appropriate treatment or disposal. This analysis encompasses the proposed action in this EA and is applicable to the launch of solid propellant FTF targets. Therefore no significant impacts would be expected from hazardous materials or waste management for the proposed action.

Post-launch. Post-launch refurbishment and blast residue removal are all routine post-launch activities. During this process, all hazardous materials and associated wastes would be responsibly managed in accordance with the well-established policies and procedures identified in Section 3. All hazardous and non-hazardous wastes, including industrial wastewater from launch pad catchments, would be properly disposed of, in accordance with applicable Federal, state, local, DoD regulations. Hazardous material and waste-handling capacities would not be exceeded, and management programs would not have to change. As a result, no adverse impacts from the management of hazardous materials and waste are expected.

The impacts of post-launch activities resulting from boosters hitting the ocean have been analyzed in the BMDS PEIS. Accordingly, no significant impacts to the ocean environment would be expected from post-launch activities involving liquid propellant missile. During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In freshwater at 20^{o}C (68^{o}F), it is likely to take over a year for the perchlorate contained in solid propellant to leach out into the water. Lower water temperatures and more saline waters would likely slow the leaching of perchlorate from the solid propellant into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations. (MDA, 2007a) Therefore, post-launch impacts related to hazardous materials and waste are not anticipated to be significant.

4.4.1.7 Health and Safety

Pre-launch. Potential impacts on the health and safety of workers could occur as a result of accidents and exposure to air emissions and hazardous materials/waste during proposed site preparation and construction activities. Potential impacts on the health and safety of the public could occur as a result of exposure to air emissions caused by site preparation and construction activities and by the transportation of the target to the launch site.

General safety procedures would be followed to protect construction workers and launch location employees during site preparation and construction activities. During the site preparation and construction phase, there may be typical construction-related occupational exposures to fugitive dust kicked up from land disturbances and to pollutants emitted from vehicles and earth-moving equipment, including particulate matter, NO_X, SO_X, and CO.

A health and safety plan would be prepared by the contractor at the site and submitted to the local launch authorities to ensure the health and safety of on site workers. A formally trained individual would be appointed to act as safety officer. The appointed individual would be the point of contact on all problems involving job site safety. During performance of work, the contractor must comply with all provisions and procedures prescribed for the control and safety of construction team personnel and visitors to the job site. Compliance with applicable DoD, OSHA, other Federal, state, local, and location-specific health and safety regulations and programs would ensure that site preparation and construction of the launch facilities would not impact the health and safety of workers or launch location personnel.

Impacts on the public would not be significant because, as discussed above, regional air quality would not be adversely affected by fugitive dust or construction vehicle emissions.

The primary hazard related to the transportation of the target would be the potential for an accident involving the transport vehicle and a resulting explosion/fire of solid fuel motors and/or small explosive actuation devices (used in missile control and FTS). Operations involving the transport of explosives (including packaging and handling for movement) would require implementation of written procedures, which would be approved by AADC and MDA. Transport operations would be conducted under the supervision of an approved ordnance officer using explosive-certified personnel as necessary. Consequently, minimal health and safety impacts would be expected during transport of missile components.

The SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 targets would use hydrazine and on site loading into the ACM ACS would be required. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area. Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any small leaks/spills would be contained in a drip pan partially filled with water. Water would be added to larger leaks/spills to dilute the hydrazine and moist absorbent pads/booms would be used to contain and isolate the release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release. No impact on the general public would be expected.

Launch. Potential impacts on health and safety from the launch of solid propellant targets include exposure to explosives, contact with launch debris, and exposure to noise produced during launch. The GMD ETR EIS provides an analysis of KLC's specific health and safety planning procedures. Before each launch at KLC, the Range Integrator and the KLC Safety Officer must approve all flight plans, trajectories, and planned impact areas. The KLC Safety Officer would issue range clearance and surveillance for the LHA and flight safety corridor. The KLC Safety Officer would establish the safety zones around the launch site and along the missile flight path no less than four (4) hours before each launch. Official NOTAMs and NOTMARs would be used to identify the areas to be cleared. The KLC Safety Officer would then ensure the safety zone is verified clear of non-mission essential personnel and vessels out to the territorial limit approximately 20 minutes before launch. On site launch personnel would be protected from launch event hazards; therefore, no significant health and safety impacts are expected.

Post-launch. Post-launch refurbishment and blast residue removal are routine operations at a launch site. All applicable Federal, state, and local health and safety requirements, such as OSHA regulations, would be followed, as well as all appropriate DoD regulations. By adhering to the established safety standards and procedures identified in Section 3, the level of risk to military personnel, contractors, and the general public would be minimal. Consequently, no significant impacts on health and safety are expected.

There is the potential for impact of debris from FTF target boosters at any point along the flight corridor due to malfunction and/or termination of a flight using the FTS. The resulting debris would follow a ballistic trajectory and would impact in designated impact areas in the ocean. Because an exact point of termination cannot be determined, the potential effects footprint is determined by considering the limits of debris fallout based on destruction of a target at the boundaries of the acceptable flight corridor, along with additional flight time based on the time required to initiate the FTS. (MDA, 2007a) The possibility of debris hitting the ground or water outside the designated impact area is remote; and therefore, safety impacts of flight termination would not be significant. Debris modeling and analysis would be conducted for specific proposed activities as appropriate.

4.4.1.8 Land Use

Pre-launch. The majority of the proposed site preparation and construction would occur in previously disturbed areas adjacent to existing military and commercial launch facilities. The areas proposed for construction do not contain unique or prime farmland protected under the FPPA and would not result in an adverse land use impact. All of the proposed construction would take place on property owned or designated for use by the range/launch facility and would not cause a change in any land use outside of the property boundaries. No public access to parks, popular visitor destination points, or recreation areas, including water-oriented recreational activities would be restricted by the proposed construction.

The immediate vicinity of the construction zone would be temporarily affected by limiting access to only necessary personnel. Nevertheless, such activity would be of short duration and considered normal range/launch facility activity that is consistent with KLC's general land use. The proposed site preparation and construction is entirely consistent with KLC's mission and would occur in accordance with existing land use plans, agreements, policies, or controls, resulting in no significant impacts.

Launch. Launch preparations scheduled at KLC would follow standard evacuation procedures of the launch vicinity. The Range Safety Officer would develop a LHA around the proposed launch site established by AADC in accord with the Interagency Land Management Agreement for the property. All civilian, nonessential contractor, personnel, and general public would be cleared from the LHA several hours before launch. Agencies that would enforce the clearance of land areas would be notified in preparation for the procedures once a test event is officially scheduled. A notice of intent to clear hazardous areas would be published in the local newspaper and broadcast in local media approximately one week in advance of the launch. The boundaries of the LHA would also be posted with notifications.

Flight safety corridors would be determined for each missile flight and would be verified clear according to range safety requirements. The availability of recreational opportunities at Narrow Cape would not be significantly impacted by the FTF Target activities. Only temporary closures during the transportation of target components to the launch facilities and up to a full day closure on launch days would occur for the Pasagshak Point Road at the KLC site boundary. Public access through KLC to Fossil Beach would be limited or denied for each launch day. Although these safety closures would restrict beach combing, bird and whale watching, and fishing on these days, such temporary closures would not be considered to have an appreciable impact. Furthermore, any activities that could possibly restrict access to any recreational areas would be in the newspaper and announced on the local radio. If required, submission of a Coastal Project Questionnaire would be coordinated among AADC, the USACE, and MDA. The Coastal Project Questionnaire would be submitted to the State of Alaska to confirm that actions would be consistent with the Alaskan Coastal Zone Management Program and the Kodiak Island Borough Coastal Management Program.

Post-launch. There would be no land use issues associated with post-launch activities as post-launch cleanup and refurbishment of the launch site would put the site back to its pre-launch condition. Debris would fall into the BOA and sink into the ocean causing no impacts on land use.

4.4.1.9 Transportation

Pre-launch. Section 2.7.3.1 describes proposed site preparation and construction activities for KLC. The construction equipment and materials would be brought to Kodiak Island by ocean carrier or by plane and transported over land or via barge/beach landing to KLC. Kodiak Island is already one of the leading shipping ports in southwest Alaska and as a commercial service facility is equipped to accommodate international cargo receipt and shipment. Scheduled service is in place to support the normal level of traffic; however, peak demands are anticipated and scheduled in advance. In addition, vessels serving the Alaska Marine Highway System (AMHS) are rarely booked full to capacity with container vans. These activities would be considered normal usage and would not result in an impact to the ocean transportation systems.

Due to the nature of the road conditions leading to KLC, movement of construction equipment and material would cause temporary traffic delays; however, these delays would be infrequent. Public announcements regarding potential delays would be made, and movements during off-peak travel hours would be scheduled to the greatest extent possible.

The roadways supporting the individual facilities within KLC are designed to accommodate tractor-trailer transport vehicles as well as passenger vehicles and light trucks. Road grades range from 1 percent to over 15 percent. Due to the nature of these road conditions, project related movements would also cause temporary traffic delays within KLC; however, they would not extend to local roads. Impacts from the temporary increase in construction personnel at KLC would be temporary and would not be expected to have a significant adverse effect on ground transportation.

Launch. NOTMARs would be issued when a launch has the potential to impact marine areas and would allow marine vessels to clear the affected area; thus launch activities would have no impact on marine transportation. (MDA, 2007a) The GMD ETR EIS describes the process used to clear sea-surface areas at KLC. (MDA, 2003a)

Sea-surface areas that would have to be cleared include the LHA that extends over water, the predicted booster drop zones, the predicted debris impact area, and the predicted whole body miss impact point for each missile. Sea-surface areas would be cleared with the cooperation of the U.S. Coast Guard. Sea-surface areas would need to be cleared in advance of a planned test event to allow sufficient time to ensure that it is indeed clear; this would be approximately four hours before test launch. The U.S. Coast Guard would publish a NOTMAR to clear certain sea-surface areas for safety reasons. Notice of intent to clear certain sea-surface areas for safety reasons would be published in local newspapers, broadcast in local news media, and distributed to commercial fishing and tourist boating trade associations.

Subject to the conditions of appropriate Memoranda of Agreement, Coast Guard officials would close the sea-surface area(s) up to four hours before the planned launch and then survey them to ensure that they are clear of ships or watercraft. Coast Guard boats and range safety aircraft would patrol the area to ensure that it is clear of ships or watercraft. The AMHS ferry route is north of Kodiak and away from the KLC launch azimuth; therefore, no impacts to vessels traveling these routes would occur. The Pacific Ocean south of Kodiak does contain commercial shipping lanes for vessels traveling from Seattle to and from Nome and Yokohama. These vessels would be required to stay clear of these areas during a launch, which could cause them to be slightly delayed. These delays would be short-term and infrequent (up to two times per year), however, and the advance notification would serve to further minimize any impact. Commercial and recreational fishing vessels would also be required to relocate their activities during a launch event; however, they would only be required to move for a short period of time and this would only occur infrequently (up to two times per year for FTF targets).

Because the launch azimuth for KLC is southwest and southeast over the Pacific Ocean and would not be over any public roads, there would be no impact on road transportation.

NOTAMs would be issued prior to launch events that would notify pilots of proposed airspace closures. Impacts on air transportation are discussed above in Airspace.

Post-launch. Debris from boosters may fall into waters normally used for commercial shipping. The majority of international trade uses routes of least distance. The actual debris impact area for boosters would be small and would depend upon the individual flight path. Prior warning of proposed launch activities through issuances of NOTMARs would enable commercial shipping to follow alternative routes away from the proposed debris impact area.

4.4.1.10 Noise

Pre-Launch. Construction would result in intermittent, short-term noise effects that would be temporary, lasting for the duration of the noise generating construction activities. Noise-generating construction activities would include excavation, clearing, grading, and paving and the following construction vehicles would be used during the site preparation and construction activities at KLC: bulldozers, cement trucks, asphalt spreader, compactors, motor grader, dump truck, flatbed truck, backhoe, clamshell, mobile crane, and water tanker truck. Exhibit 4-9 describes the typical construction noise levels at KLC from these vehicles.

Exhibit 4-9. Typical Construction Noise at KLC (dBA)

Source	Noise Level (peak)	Distance from Source			
		15 meters (50 Feet)	30 meters (100 feet)	61 meters (200 feet)	122 meters (400 feet)
Bulldozer	107	87-102	81-96	75-90	69-84
Cement truck	105	85	79	73	67
Asphalt spreader	108	88-91	82-85	76-79	70-73
Compactor	108	88	82	76	70
Grader	108	88-91	82-85	76-79	70-73
Dump truck	108	88	82	76	70
Flatbed truck	95	84-89	78-83	72-77	66-71
Backhoe	93	80-89	74-82	68-77	60-71
Clamshell	93	80-89	74-82	68-77	60-71
Mobile crane	104	75-88	69-82	63-76	55-70
Water tanker truck	95	84-89	78-83	72-77	66-71

Source: FAA, 1996

Due to the exclusion of the public from the immediate vicinity of the construction site, the public would not be exposed to hazardous noise levels. However, the public within a few kilometers (miles) of KLC would be subject to noise that could decrease the existing aesthetic quality. The nearest residence is approximately 3 kilometers (2 miles) from KLC. Individuals living near the Pasagshak Point Road would experience a slight increase in traffic noise.

Launch. Launches would not add new types or levels of noise to KLC. Noise levels produced by the launch of FTF Targets would be similar to past and current noise levels. A maximum of two FTF target launches would be launched per year, and these launches would be short in duration. During launch events, all personnel would be located at Launch Control Center and would be protected from noise by the sound attenuation provided by the buildings construction. All non-essential personnel would be located outside of the general hazard area. Personnel exposed to excessive launch noise would wear hearing protection. Noise would not be expected to interfere with the area's fishing, camping, or other recreational uses. Noise impacts on biological resources are addressed in Biological Resources.

As discussed in the BMDS PEIS, sonic booms may also be generated during launch or booster reentry. Areas affected by a sonic boom could extend up to several miles on each side of the focal point of the sonic boom. Sonic booms may produce overpressures as high as 8 to 16 pounds per square foot, but this would be of a very short duration, lasting up to several milliseconds. (MDA, 2007a)

Given the infrequency of the launches, the short duration of the launch and similarity to previous launches, adverse impacts to the public from launch activities are not anticipated.

Post-launch. Because of the limited activities associated with post-launch operations, limited amounts of noise would be generated. Thus, no impacts on ambient noise levels are expected.

4.4.1.11 Socioeconomics and Environmental Justice

Pre-Launch. Potential socioeconomic impacts could occur as the result of the influx of temporary construction personnel to Kodiak Island. Potential environmental justice and children's health impacts could occur as the result of air emissions and noise associated with site preparation and construction.

Approximately 50 construction personnel would be required on Kodiak Island for approximately 12 months during the course of construction of the new target launch pad and infrastructure modifications. The housing needs of the additional personnel during site preparation and construction would be met via local hotels and guesthouses and would not result in a significant socioeconomic impact. The additional construction personnel, by spending money in the local economy via procurement of goods and services, would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local community. The overall impact would be slight and would not cause any population growth. The proposed construction activities would not cause displacement or other significant impacts to populations, residences, or local businesses within the Kodiak Island Borough and would not result in a significant impact.

Short-term air emissions and noise impacts associated with the proposed site preparation and construction would not have significant impacts on the health or environment of minority, low-income, or children's populations located in the Kodiak Island Borough.

Effects from the proposed action are not concentrated in an area that might contain proportionally more minority, low-income, or children and thus, the impacts of the proposed action should not be disproportionate as defined under Executive Orders 12898 and 13045. Overall, no significant socioeconomic, environmental justice, or children's health impacts would occur from the proposed site preparation and construction activities.

Launch. Up to two FTF target launches per year are anticipated at KLC. A typical ramp up over a three-month period would be 22, 55, and 110 personnel required at KLC to support a target missile launch. The housing needs of the additional personnel would be met via local hotels and guesthouses and would not result in a significant socioeconomic impact. The additional launch support personnel, by spending money in the local economy via procurement of goods and services, would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local community. The overall impact would be slight and would not cause any population growth. The proposed launch activities would not cause displacement or other significant impacts to populations, residences, or local businesses within the Kodiak Island Borough and would not result in a significant impact. After a target launch, the majority of these personnel would immediately depart KLC and Kodiak Island.

As part of pre-launch and flight activities, an LHA and flight safety zone would be established in accord with AADC's Interagency Land Management Agreement for Narrow Cape, which provides for public access except in cases of danger and for protection of structures. These areas would be cleared approximately 1 to 4 hours before a launch. The actual launch is expected to last approximately 30 minutes. Upon the Range Safety Officer declaring the area safe after a launch, expected to be within hours, the areas can then be reoccupied. The notice given to the local communities via local newspapers, broadcast media, and commercial fishing and tourist boat trade associations would be extensive. As such, entities with an economic interest in the use of these areas such as the commercial fishing, aviation, and tourist industries of Kodiak would not be significantly impacted by the proposed clearance areas.

No population, housing or businesses would be displaced during launch activities. No significant impacts to locally significant businesses or industries such as commercial fishing, fish processing, tourism, or logging are anticipated during launch activities. Also, personnel would be restricted to KLC during working hours and significant impacts to subsistence hunting, recreational hunting, hiking, or other recreational activities or areas are not anticipated.

Short-term air emissions and noise impacts associated with launch would not have significant impacts on the health or environment of minority, low-income, or children's populations located in the Kodiak Island Borough. Effects from the proposed action are not concentrated in an area that might contain proportionally more minority, low-income, or children and thus, the impacts of the proposed action should not be disproportionate as defined under Executive Orders 12898 and 13045. Overall, no significant socioeconomic, environmental justice, or children's health impacts would occur from the proposed target launch.

Post-launch. No impacts are expected on socioeconomics and environmental justice from post-launch activities.

4.4.1.12 Visual Resources

Pre-launch. Section 2.7.5.1 describes the proposed site preparation and construction activities at KLC. Potential impacts to visual resources could occur as a result of construction of a new target launch pad and the installation of a lightning protection system. Construction would occur only in the daytime, which precludes any impacts on visual resources due to nighttime lighting.

The proposed construction would place additional man-made structures within an area already designated and developed as a commercial launch facility. Although the area surrounding KLC can be considered regionally scenic, the natural visual landscape of the area has already been altered by the existing KLC buildings, launch infrastructure, and the nearby U.S. Coast Guard's 190-meter (625-foot) navigation transmitter tower and associated buildings. There are no residences in the immediate vicinity of KLC, and the nearest park is approximately 10 kilometers (6 miles) away. (MDA, 2003a) If sensitive viewers happened to be in the area, particularly hikers, fishermen, and other recreational users, they would potentially be affected by the addition of new infrastructure. However, impacts are not expected to be significant given the limited amount of concerned viewers and the placement of new infrastructure in a previously altered visual landscape adjacent to existing launch facilities.

Launch. Based on the brevity of launch events and the infrequency of FTF target launches proposed at KLC, target launch would not significantly impact the visual landscape at KLC.

Post-launch. No post-launch activities would be expected to affect visual resources.

4.4.1.13 Water Resources

Pre-launch. Site preparation and construction activities for KLC would occur as described in Section 2.7.5.1. Site preparation and construction of a new target launch pad would disturb approximately 2,840 square meters (30,625 square feet) of land and could result in short-term adverse water quality impacts to nearby surface waters. Potential impacts include increased soil erosion, siltation, and turbidity levels in receiving waters as well as impacts from accidental spills of the materials used during construction procedures or by construction vehicles, including fuel, cement, paint, anti-freeze, oil, etc.

Construction of a lightning protection system and metal tie downs to support the CE would not result in significant impacts to surface water quality because these activities would occur within the footprint of the launch pad, requiring little to no additional ground disturbance.

Applicable permits would be obtained and spill response protocols would be developed before commencing construction. Best management practices and other SOPs would be used during site preparation and construction activities to minimize erosion, storm water pollution, and other types of impacts that could adversely impact surface water quality. Water quality-related SOPs that KLC would follow include:

- Site preparation – vegetation preservation and protection, topsoil preservation, dust control, and temporary gravel construction entrance and exit
- Surface stabilization – temporary and permanent seeding and use of mulches and fabric and gravel blankets
- Runoff control and conveyance measures – installation of diversions, dikes, grassed waterways, and temporary slope drains
- Sediment barriers – straw bale and rock barriers, sediment fences
- Sediment traps and basins
- Stream protection – temporary stream crossings and stream bank stabilization
- Protection of soil and fill storage piles

SOPs related to the handling, disposal, recycling, and other use of hazardous materials and wastes would be followed, including spill prevention, containment, and control measures while transporting equipment and materials. Other water quality-related SOPs to be followed include the use of portable toilets and waste disposal practices during construction, rapid response, control, and cleanup activities in the event of unplanned spills or accidents, and worker education and training programs.

Conformance with KLC's SOPs and other best management practices for construction would be expected to minimize the magnitude of adverse surface water quality impacts. Only minor erosion and turbidity impacts, if any, and insignificant and accidental spillage of petroleum products and other construction-related materials are expected.

Ground water would not be adversely impacted by proposed site preparation or construction activities. Ground water would not be directly encountered during construction excavation activities and incidental spills or leaks from construction equipment would not be expected to reach ground water level.

The proposed site preparation and construction has the potential for indirect impacts to wetlands in the vicinity of the proposed launch pad. Indirect impacts can be caused by disturbance to adjacent land that results in degradation of water quality from chemical or sedimentary runoff. However, the implementation of appropriate techniques to control runoff and other Best Management Practices discussed above would minimize potential impacts to water quality so that no significant impacts to wetlands would be anticipated.

Launch. The GMD ETR EIS analyzes the impacts of solid propellant target launch on water resources. The missiles launched from KLC under the Proposed Action would disperse certain exhaust emission products over a large area. The primary emission products of concern from a water quality-standpoint are HCl and Al_2O_3. These emissions are not expected to cause a significant water quality impact. Environmental monitoring was required as part of the KLC launch site operator license and called for the monitoring of at least the first five launches from KLC. As summarized in *Summary Findings of KLC Environmental Monitoring Studies 1998-2001*, water quality sampling and analysis indicate there have been no discernable effects on water chemistry from KLC launches to date.(MDA, 2003a) Water quality was sampled before and after KLC launches, including pH level, total aluminum, and perchlorate concentration. Based on the results of prior studies, the proposed action would not be expected to have a significant impact on water quality.

Post-launch. Post-launch activities are not expected to have any impacts on water resources.

4.4.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Because KLC is a location proposed to support the land launch of FTF targets and would not serve as a staging location for air-based launches, potential environmental impacts on all resource areas from the launch of FTF targets from KLC would be the same under alternative 1 as under the proposed action.

4.4.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. No construction or site preparation activities would occur in support of the proposed action at KLC. Pre-launch, launch, and post-launch activities involving SR19/SR73, LV-2, or LV-3 would not occur from KLC as proposed. MDA would continue to launch those target configurations from KLC analyzed in existing NEPA documentation. Under the no action alternative there would be no environmental impacts to any environmental resource areas at KLC from the proposed action and existing planned launch activities would continue to occur.

4.5 Vandenberg AFB, California

Pre-launch, launch, and post-launch activities at Vandenberg AFB for the proposed action would occur as described in Sections 2.6, 2.7.2.1, 2.7.3.1, 2.7.4.1, and 2.7.5.1. Activities for alternative 1 and the no action alternative would occur as described in Sections 2.8 and 2.9.

Many of the pre-launch, launch, and post-launch activities described in these sections are routine actions at Vandenberg AFB that have been previously analyzed and found to have no significant impact. Pre-launch site preparation and construction activities would have no impact on airspace or hazardous materials and waste at Vandenberg AFB. Pre-launch pad setup activities would have no impact on land use, socioeconomics and environmental justice, transportation, visual resources, or water resources at Vandenberg AFB.

Documents that have previously analyzed these activities in these resource areas at Vandenberg AFB include: Mobile Sensors EA (MDA, 2005), Courtland EA (MDA, 2006), LPM Site Preparation and Launch EA (MDA, 2002d), TMD ETR EIS (SSDC, 1994a), GMD ETR EIS (MDA, 2003a), GMD IDOC at Vandenberg AFB EA (MDA, 2003b), Final EA for the Orbital/Sub-Orbital Program (U.S. Department of the Air Force, 2006a), and the ABV Verification Tests EA (MDA, 2002e). The findings of these documents are summarized below and any impacts specific to the FTF Program are discussed in the appropriate sections.

Post-launch impacts would include clearing debris from the launch area as addressed in the GMD ETR EIS (MDA, 2003a) and the Orbital/Sub-Orbital Program EA (U.S. Air Force, 2006a) and would pose no impacts. FTF targets launched from Vandenberg AFB would be launched over the BOA and would not be recovered; therefore no post-launch FTF target debris would be expected to pose environmental impacts.

General, non-site-specific impacts of many of the activities described in this EA have been analyzed in the BMDS PEIS (MDA, 2007a). The site-specific analyses and impacts described in this EA tier from those general analyses in the BMDS PEIS.

4.5.1 Proposed Action

4.5.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to Vandenberg AFB could occur from truck and air transportation of the target to the launch location.

As described in Section 2.6, a maximum of four roundtrip target shipments per year to and from Vandenberg AFB would occur under the proposed action. Four roundtrip shipments would increase the number of landings and takeoffs at Vandenberg AFB by up to a maximum of 64 flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17s and one C-5 aircraft (i.e., one FTF target shipment).

For each launch event, each transport plane would be involved in one landing/takeoff cycle. Exhibit 4-4 presents the total emissions per launch event. Assuming that four FTF launches occurred at Vandenberg AFB each year, the maximum amount of annual emissions at Vandenberg due to aircraft transport into and out of the base would be 0.35 metric tons (0.38 tons) of HC, 1.38 metric tons (1.52 tons) of CO, 1.76 metric tons (1.94 tons) of NO_X, and 0.064 metric tons (0.07 tons) of SO_2. Vandenberg AFB is in attainment for all federal National AAQS, however, Vandenberg is classified as non-attainment for ozone under the California state AAQS. Although NO_X is considered a pre-cursor to ozone, and therefore these additional flights may have an impact on local air quality, the addition of 1.76 metric tons (1.94) of NO_X annually would be below federal *de minimis* quantities and therefore no significant impacts on air quality would be expected.

Once at Vandenberg, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel 16 kilometers (10 miles) to the TP-01 launch site, 19.3 kilometers (12 miles) to the LF-05 launch site, or 22.5 kilometers (14 miles) to the LF-06A launch site over government-controlled roads. Emissions from ground transportation vehicles were analyzed in the Mobile Sensors EA (MDA, 2005). Exhibit 4-10 presents the estimated emissions per mile from that analysis.

Exhibit 4-10. Ground Transportation Emissions Vandenberg AFB

Pollutant	Emissions, grams per mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year, metric tons (tons)
VOC	1.100	0.00003 (0.00003)	0.0014 (0.0015)
CO	6.461	0.0002 (0.0002)	0.01 (0.01)
NO_X	15.434	0.0004 (0.0004)	0.02 (0.02)
PM_{10}	0.316	0.00001 (0.00001)	0.0005 (0.0006)
SO_2	0.346	0.00001 (0.00001)	0.0005 (0.0006)

[1] The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to total 28 miles.

The increased emissions from an additional 12 trucks up to four times per year traveling a maximum of 45 kilometers (28 miles) would be 0.0014 metric tons (0.0015 tons) of VOCs, 0.01 metric tons (0.01 tons) of CO, 0.02 metric tons (0.02 tons) of NO_X, 0.00005 metric tons (0.0006 tons) of PM_{10}, and 0.0005 metric tons (0.0006 tons) of SO_2. These levels are extremely small and much less than the Federal NAAQS for non-attainment areas, and are also much smaller than the *de minimis* levels of increased emissions that would trigger mitigation measures. The estimated emissions from ground vehicles transporting the FTF target and its supporting equipment at Vandenberg AFB would be significantly below the Federal *de minimis* levels for all pollutants. Therefore, emissions from ground transportation vehicles for FTF target shipments on site at Vandenberg would not pose any significant impact on air quality.

Pre-Launch. Impacts on air quality from pre-launch activities at Vandenberg AFB could occur from physical site preparation and construction activities and pad setup activities preparing the targets for launch.

Site preparation and construction activities would occur at the TP-01 launch site only at Vandenberg AFB under the proposed action. Construction of a trench to lay fiber optic cable and construction of new concrete areas to provide CT access and to expand the parking lot at the launch site would result in a disturbance of approximately 0.35 hectares (0.86 acres) of soil. Potential impacts include increased particulate matter from construction-related activities and exhaust emissions from construction equipment and related vehicles. These emissions would be short-term, and would only affect those receptors close to construction areas.

Construction would require ground disturbances resulting in PM_{10} and fugitive dust impacts. In a 1995 study, EPA estimated that ground-disturbing activities cause the release of 1.08 metric tons (1.2 tons) of uncontrolled fugitive dust emissions per 0.4 hectare (1 acre) per month of ground-disturbing activity. Therefore, the disturbance of 0.35 hectare (0.86 acre) over 8 months would result in 7.5 metric tons (8.3 tons) of fugitive dust emissions. Standard fugitive dust reduction measures would be implemented to reduce fugitive dust emissions, including application of water to excavated and graded areas to dampen soil, minimizing vehicles speeds on exposed earth, covering soil stockpiled for more than two days, and establishment of vegetative or other groundcover following completion of project activities. (U.S. Department of the Air Force, 2006a) For the purposes of this analysis, it was conservatively assumed that dust control measures would be 50 percent effective and that PM_{10} would comprise 50 percent of the total fugitive dust emissions. Therefore the total estimated PM_{10} emissions from ground-disturbing activities over eight months would be 1.9 metric tons (2.1 tons).

The use of construction equipment would result in emissions of CO, NO_X, VOCs, PM_{10}, and SO_X. Typical heavy-duty construction equipment, such as bulldozers, graders, dump trucks, cement trucks, cranes, front-end loaders/backhoes, roller, power hand tools, and compactors, would be required during construction. For the purposes of analysis, it was conservatively assumed that the construction vehicles would be active 10 hours per day for the estimated 160 days of construction.[8] The daily and total emissions from construction vehicles are presented in Exhibit 4-11 (for CO, VOCs, NO_X, and SO_X) and Exhibit 4-12 (PM_{10}). Proper tuning and preventive maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance.

[8] Although total construction time would be expected to take approximately 10 months, only eight months were assumed to require ground-disturbing activities. Assuming there are four work-weeks per month, and that each work-week consisted of five days, the total number of construction days would be 160.

Exhibit 4-11. Construction Vehicle Emissions Vandenberg AFB

Equipment	Number	Unit Emission Factors (kg/hr)				Emissions (kg/day)			
		CO	VOC	NO_X	SO_X	CO	VOC	NO_X	SO_X
Bulldozer	1	0.81	0.08	1.89	0.16	8.1	0.8	18.9	1.6
Cement Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Compactor	1	0.31	0.06	0.77	0.06	3.1	0.6	7.7	0.6
Motor Grader	1	0.07	0.02	0.32	0.04	0.7	0.2	3.2	0.4
Dump Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Flatbed Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Backhoe	1	0.81	0.08	1.89	0.16	8.1	0.8	18.9	1.6
Clamshell	1	0.81	0.08	1.89	0.16	8.1	0.8	18.9	1.6
Mobile Crane	1	0.31	0.06	0.77	0.06	3.1	0.6	7.7	0.6
Water Tanker Truck	1	0.81	0.08	1.89	0.20	8.1	0.8	18.9	2.0
Total Emissions, kg/day (lb/day)						**63.6 (140.2)**	**7.0 (15.4)**	**150.9 (332.7)**	**14.4 (31.8)**
Total Construction Vehicle Emissions, metric tons (tons)[a]						**10.2 (11.2)**	**1.1 (1.2)**	**24.1 (26.6)**	**2.3 (2.5)**

[a] Assumed 160 days of construction

Exhibit 4-12. Construction Vehicle PM_{10} Emissions Vandenberg AFB

Equipment	Number	Power	PM_{30} Emission Factor (kg/hr)	Ratio of PM_{10} to PM_{30}	PM_{10} Emission Rate (kg/day)
Bulldozers	1	Diesel	0.075	0.5	0.4
Cement Trucks	1	Diesel	0.116	0.5	0.6
Asphalt Spreader	1	Diesel	0.075	0.5	0.4
Compactors	1	Diesel	0.0632	0.5	0.3
Motor Grader	1	Diesel	0.0277	0.5	0.1
Dump Truck	1	Diesel	0.116	0.5	0.6
Flatbed Truck	1	Diesel	0.116	0.5	0.6
Backhoe	1	Diesel	0.075	0.5	0.4
Clamshell	1	Diesel	0.075	0.5	0.4
Mobile Crane	1	Diesel	0.0632	0.5	0.3
Water Tanker Truck	1	Diesel	0.116	0.5	0.6
Total Daily Emissions, kg/day (lb/day)					**4.7 (10.4)**
Total Construction Vehicle Emissions, metric tons (tons)[a]					**0.75 (0.83)**

[a]Assumed 160 days of construction; 10 hours per day
Source of both Exhibits: *of Air Pollutant Emission Factors* (AP-42), Volume II. Dump trucks, flatbed trucks, cement trucks, and water tanker trucks were classified as off highway trucks; backhoes, clamshells, and bulldozers were classified as wheeled dozers; and mobile cranes and compactors were classified as miscellaneous.

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A summary of all construction-related emissions is shown in Exhibit 4-13.

Exhibit 4-13. Summary of Construction-related Emissions Vandenberg AFB

Source Type	Total Emissions from Constructions, metric tons (tons)				
	CO	VOC	NO_X	SO_X	PM_{10}
Ground Disturbing Activities	-	-	-	-	1.9 (2.1)
Construction Vehicles	10.2 (11.2)	1.1 (1.2)	24.1 (26.6)	2.3 (2.5)	0.75(0.83)
TOTAL	**10.2 (11.2)**	**1.1 (1.2)**	**24.1 (26.6)**	**2.3 (2.5)**	**2.7 (3.0)**

Vandenberg AFB is in attainment for all NAAQS, however, the base is classified as non-attainment for the California state AAQS for ozone and PM_{10}. NO_X emissions are considered ozone precursors, and therefore temporary increases in NO_X and PM_{10} emissions from site preparation and construction could require consultation with the Santa Barbara Air Pollution Control District to determine appropriate mitigation measures. However, the estimated increases in NO_X and PM_{10} from the proposed site preparation and construction activities at Vandenberg AFB are considerably below any Federal *de minimis* levels.

Construction would be conducted in accordance with all applicable laws and regulations. While the construction would cause a slight increase in some air pollutants, the impact would be both temporary and localized. Once construction ceased, air quality would return to its former level. Therefore the impacts from site preparation and construction activities at Vandenberg would not be significant.

General impacts on air quality from pre-launch pad setup activities for solid propellant boosters are analyzed and summarized in the BMDS PEIS. (MDA, 2007a) In that document, the analysis concluded that for solid propellant boosters, impacts on air quality from pre-launch pad setup activities would be not significant.

Pre-launch pad setup activities for liquid propellant boosters were analyzed in the LPM Site Preparation and Launch EA (MDA, 2002d). The EA found that there would be no emissions from propellant loading activities since it is a closed loop system. Emissions from launch preparation activities would be regulated in accordance with Santa Barbara County Air Pollution Control District Rules and Regulations. Therefore impacts from pre-launch pad setup activities for liquid propellant targets would be not significant.

Launch. The largest FTF target proposed to be launched at Vandenberg AFB is the LV-3 with a total propellant mass of 43,258 kilograms (95,367 pounds). The launch of the Peacekeeper missile that has a larger propellant mass has been analyzed from Vandenberg AFB in the GMD ETR EIS. (MDA, 2003a) Because the LV-3 has less propellant mass than the Peacekeeper, the launch of the LV-3 from Vandenberg AFB would be expected to have similar or fewer impacts than those discussed in the GMD ETR EIS for the Peacekeeper.

At Vandenberg AFB, the GMD ETR EIS analyzed dual Peacekeeper target launches using the Open Burn/Open Detonation Dispersion Model and determined that the level of HCl would be below the 1-hour Air Force standard, but would exceed the peak HCl standard for a short duration. Emission levels for both CO and Al_2O_3 were determined to be within NAAQS and California AAQS. The nominal launch of a Peacekeeper target was anticipated to remain within NAAQS, California AAQS, and Air Force standards. Because the LV-3 has less propellant mass than the Peacekeeper, and therefore fewer emissions, the launch emissions from the LV-3 from Vandenberg AFB would be expected to be within NAAQS, California AAQS, and Air Force standards.

The launch of a single stage liquid propellant target requiring approximately 907 kilograms (2,000 pounds) of main fuel, 2,930 kilograms (6,456 pounds) of oxidizer and 27 kilograms (60 pounds) of initiator fuel was analyzed in the LPM Site Preparation and Launch EA. This analysis concluded that the total foreseeable direct and indirect emissions caused by the launch of two LPMs would both be less than the mandated Federal *de minimis* thresholds.

The environmental impact of land launches of solid and liquid propellant targets would not be substantial. Because the booster is moving away from the point of launch, only a small portion of the launch exhaust would be emitted near the launch area. The moderate to high winds at Vandenberg tend to disperse ground level emissions and therefore Vandenberg experiences a low concentration of air emissions from missile launches. Launch activities would not be expected to bring any new stationary emission sources to the launch area; therefore, new permits or changes to existing air permits would not be required. Launch/flight activities can contribute to global warming through the emission of greenhouse gases. These emissions could include water vapor and CO_2. However, launch/flight activities would not contribute significantly to the total emissions of these gases, and so would not have a significant effect. (MDA, 2007a)

Missile launches are short-term, discrete events, allowing time between launches for emissions to be dispersed. Emissions from launch activities would be regulated in accordance with the agreement between Vandenberg AFB and the Santa Barbara County Air Pollution Control District for Vandenberg AFB to apply innovative pollution prevention techniques to reduce emissions from their facilities. Therefore no significant impacts on air quality would be expected from launches of FTF solid and liquid propellant targets at Vandenberg AFB.

Post-launch. Any post-launch refurbishment activities would meet all applicable rules for VOCs. No air emission permits are required for these operations. With the exception of some minor, localized increases in particulate matter from the occasional brushing of blast residues from the launch tube walls, if necessary, and launch stools, no adverse effects on air quality are expected.

The impacts on air quality from post-launch activities resulting in boosters hitting the ocean have been analyzed in the BMDS PEIS. Impacts would be similar to, but less than those impacts for boosters hitting land because the residual liquid propellants would be released into the ocean rather than the air. Solid propellant, if still in the casing, might continue to burn for some time even under water, possibly impacting air quality. (MDA, 2007a) Because FTF targets would also impact the BOA, impacts would be similar to those discussed in the BMDS PEIS, and minimal impacts to air quality would be expected.

4.5.1.2 Airspace

Pre-launch. Impacts on airspace from pre-launch activities at Vandenberg AFB could occur from air transportation of the targets to the launch location.

General impacts on airspace of air transportation activities have been previously analyzed in the BMDS PEIS. (MDA, 2007a) The analysis in that document determined that an increase in air transportation operations could affect the airspace of the location where such activities would occur. The BMDS PEIS concluded that, because all operations involving air transportation of targets would be performed in accordance with existing airspace use requirements, impacts on the airspace in all locations would be not significant. Air transportation associated with the launch of FTF targets at Vandenberg AFB would be performed in accordance with both existing airspace use requirements and Vandenberg's standard operating procedures; therefore, significant impacts on airspace would not be expected.

Launch. All launches, intercepts as appropriate, and debris impacts would take place in either existing restricted area or warning area airspace that would be cleared of non-participating aircraft prior to each launch. The launches would be short-term events, after which joint-use airspace would be released to other users; scheduling would obviate impacts. Vandenberg AFB has an annual average of 15 missile launches and 100 test flights. (SSDC, 1994a) Therefore the impacts on airspace of four additional launches of FTF solid and liquid propellant targets annually would not be significant.

Post-launch. If debris from FTF targets falls into the ocean, MDA would not recover the debris. Therefore, helicopters and other equipment would not be used, and no impacts on airspace would be expected.

4.5.1.3 Biological Resources

Pre-Launch. Impacts on biological resources from pre-launch activities at Vandenberg AFB could occur from site preparation and construction activities. These impacts could occur as the result of ground disturbing activities and noise during construction of a 5.6-kilometer (3.5-mile) long, 0.3-meter (1-foot) deep, 23-centimeter (9-inch) wide trench to lay fiber optic cable and new concrete surfaces for the storage building and parking lot at the Technical Support Center. The installation of a lightning protection system, metal tie downs to support the CE, and a new gate in an existing fence would not result in significant impacts on biological resources because these activities would occur within the footprint of existing infrastructure, requiring little to no additional ground disturbance.

The new concrete would create 2,200 square meters (23,678 square feet) of new impervious surface, but would not result in significant impacts on biological resources because they would occur in previously disturbed areas immediately adjacent to existing infrastructure.

Underground fiber optic cable would be installed between the TP-01 launch site and Technical Support Center using existing conduit where possible or installing new conduits that would be placed in previously disturbed areas of soil (usually along the shoulders of existing roads) to avoid sensitive biological areas. Trenching for the new communications cable/conduit would have a maximum depth of 0.3 meter (1 foot) and would affect only a small portion of the total vegetation available within Vandenberg AFB boundaries, resulting in minimal impacts. Two federally-listed endangered plant species, the Gaviota tarplant (*Dienandra increscens ssp. villosa*) and Lompoc yerba santa (*Eriodictyon capitatum*), are known to occur at Vandenberg AFB. Surveys would be performed to determine a trench design that would avoid impacts to these species. This may involve trenching down the middle of the road to ensure no impact. Because disturbed areas are prime habitat for the Gaviota tarplant, a biological assessment of the impacted area would be done. If Gaviota tarplant was found to be present, a biological opinion would be obtained from USFWS, and VAFB would work with USFWS to ensure the Gaviota tarplant would not be adversely affected.

Wildlife impacts from ground disturbance and construction noise could include habitat loss, wildlife displacement, increased stress, and disruption of daily or seasonal behavior. Cable would be installed along the shoulders of existing roads or along existing utility routes to minimize habitat loss. The combination of increased noise levels and human activity would likely displace some small mammals and birds that forage, feed, nest, or have dens in proximity to proposed construction areas. However, sufficient foraging and feeding habitat exists in adjacent areas to accommodate potentially displaced wildlife. Disturbance from equipment noise and temporary increase in personnel would be brief and is not expected to have a significant adverse effect on resident wildlife species or migratory bird populations.

Federal and state species of concern that could potentially be impacted by trench construction include the California red-legged frog (*Rana aurora draytonii,* western burrowing owl (*Athene cunicularia hypugea*), loggerhead shrike (*Lanius ludovicianus*), California horned lizard (*Phrynosoma coronatum frontale*), and silvery legless lizard (*Anniella pulchra pulchra*). Cable would be installed along the shoulders of existing roads or along existing utility routes to minimize the potential for impacts to threatened and endangered species. Biological monitors would be available onsite during installation if required by state or Federal regulations. Surveys would be performed to determine a trench design that would avoid impacts on these species.

California sea lions (*Zalophus californianus*), northern elephant seals (*Mirounga angustirostris*), northern fur seals (*Callorhinus ursinus*), and other sensitive marine mammals in adjacent offshore areas are not expected to be affected by ground disturbance and construction noise. (MDA, 2003b) The California least tern (*Sterna antillarum browni*), California brown pelican (*Pelecanus occidentalis californicus*), western snowy plover (*Charadrius alexandrinus nivosus*), and mountain plover (*Charadrius montanas*) also do not occur within close range of the proposed trench site and are not anticipated to be affected by ground disturbance and construction noise.

Launch. Normal solid and liquid propellant target land launch activities would not be expected to impact vegetation or to significantly impact wildlife. Launch activities during dry conditions could result in the deposition of small amounts of exhaust products, however, most of the exhaust would be suspended in air and dispersed over large areas; the amount deposited in surface waters would have no adverse effects. Missile launch noise may startle some wildlife species and cause flushing behavior in birds, but affected species are expected to return to normal behavior within a short time. Noise from prior launches has not appeared to affect pinniped use of the coastal areas surrounding VAFB. Noise monitoring may be performed for FTF launches in accordance with Vandenberg guidelines. Personnel would avoid bird nesting and roosting locations and pinniped haulout areas. A launch mishap or early flight termination could result in the release of propellant from liquid-propellant missiles, however the possibility of a spill or other accident in land areas involving hazardous materials impacting sensitive habitat is considered remote. (MDA, 2003a; MDA, 2002d) Therefore impacts from launches of FTF solid and liquid propellant targets on biological resources at Vandenberg AFB would be not significant.

Post-launch. The intermittent movement of trucks and any repair/clean-up/waste-handling equipment would not produce substantial levels of noise, and vehicles normally would remain on paved or gravel areas. Thus, the limited actions associated with post-launch operations would have no adverse effects on local vegetation or wildlife, including threatened and endangered species, and critical and other environmentally sensitive habitats.

The biological impacts of post-launch activities resulting in motors and boosters hitting the ocean have been analyzed in the BMDS PEIS. Expended motors and boosters hitting the ocean surface would impart a considerable amount of kinetic energy to the ocean water upon impact. For example, interceptors would hit the water with speeds of 91 to 914 meters (300 to 3,000 feet) per second. The shock wave from their impact with the water would be similar to that produced by explosives. Depending on the water depth, strong waves from the impact may detach kelp strands from the sea floor. During successful missions, boosters would impact in deep open ocean waters. At close ranges, injuries to marine mammal internal organs and tissues would likely result. However, the density of marine species including marine mammals generally decreases, and the corresponding probability of impact decreases, as the distance from the shore increases. Injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 (6 in 10,000) marine mammals exposed per year). (MDA, 2007a) Due to the infrequency of proposed FTF launches, and the low probability of marine mammal injury, the proposed action would not be expected to adversely impact marine mammals.

Impacts on marine biological resources from releases of residual propellants from liquid propellant boosters would not be significant. The natural buffering capacity of sea water and the strong ocean currents would neutralize the reaction to any release of liquid propellants associated with FTF targets.

The parts of solid rocket motor propellant expelled from a destroyed or exploded rocket motor that fall into the ocean would most likely sink to the ocean floor at depths of thousands of meters. At such depths, the propellant parts would be located away from feeding marine mammals. (MDA, 2007a) Therefore, marine animals would not be impacted from ingesting the solid propellants associated with FTF targets.

4.5.1.4 Cultural Resources

Pre-Launch. Impacts on cultural resources from pre-launch activities at Vandenberg AFB could occur from physical site preparation and construction activities.

Vandenberg AFB, in consultation with the SHPO, supports the management of the approximately 2,200 prehistoric and historic cultural sites found at the base. All proposed ground-disturbing activities and infrastructure modifications would occur in accordance with Vandenberg's policies to minimize impacts on any historic buildings, structures, objects, and archaeological resources that may be present at the site.

The LF-06 launch pad and associated support buildings are part of the 77 historic Cold War-era facilities at Vandenberg AFB that are eligible for listing on the National Register. (U.S. Department of the Air Force, 2006a) However, since no ground-disturbing site preparation and construction activities are proposed for LF-06 under the proposed action, no impacts would be expected.

New conduit and fiber optic cable would be installed in locations designed to avoid sensitive cultural areas, using previously disturbed road shoulders and existing utility corridors. No historic or National Register-eligible properties are expected to be affected by proposed trenching activities. The use of other installation methods such as slant/directional drilling for installation of required fiber optic cable under any known archaeological sites could further minimize the potential for impacts to cultural resources. No Traditional Cultural Properties, resource-gathering areas, or other concerns related to the Chumash Reservation's continued access to Vandenberg AFB have been identified. MDA would be responsible for implementation of any required avoidance of cultural resources or mitigation measures assigned to this project as a condition of approval for this activity by Vandenberg AFB. Overall, no adverse impacts on cultural resources are anticipated. Should cultural resources be found during the course of site preparation and construction activity, all activities would cease in the area and the proper authorities would be notified.

Launch. The potential environmental impact on cultural resources of land launches of solid and liquid propellant targets is considered insignificant. Potential effects could result from debris generated by launch or early flight termination striking the ground where surface or subsurface archaeological deposits or other cultural resources are located resulting in soil contamination, fire, and/or resource damage, which would all require a reparation effort. (MDA, 2003a; SSDC 1994a) The probability of launch anomaly, however, is extremely remote. If a launch anomaly does occur, fire fighting and hazardous materials cleanup could damage VAFB historical property. Any required reparation efforts would be coordinated with applicable range representatives and agencies to develop appropriate mitigation measures to avoid impact to sensitive resources and to restore natural areas as necessary. Therefore, potential impacts from launches of solid and liquid propellant FTF targets on cultural resources at Vandenberg AFB would be not significant.

Post-launch. Because of the limited activities associated with post-launch operations, no additional ground disturbance or facility modification would occur. However, because personnel would be on site during cleanup and site maintenance, the potential for unauthorized artifact collection still exists. Personnel would be reminded of the sensitivity of cultural resources and the issues of inadvertently damaging or destroying such resources. Thus, no impacts on cultural resources are expected to occur.

4.5.1.5 Geology and Soils

Pre-launch. Impacts on geology and soils from pre-launch activities at Vandenberg AFB could occur from site preparation and construction activities. Potential impacts on geology and soils would consist of soil and ground-disturbing activities and the potential for leaks and spills associated with the proposed action.

There are no geologic features present at Vandenberg AFB that would be impacted by site preparation and construction activities under the proposed action. Information bearing on seismic design and construction standards and surface faulting potential would be considered by the design engineer in making final siting and design determinations, which would minimize potential impacts.

Proposed infrastructure modifications (i.e., installation of lightning protection systems and metal tie downs) would require little to no ground disturbance and would have a localized, minimal impact on soils. New concrete surfaces would increase the amount of impervious surfaces at launch locations, but would not result in significant impacts to soils because the surfaces would be located in previously disturbed areas immediately adjacent to existing infrastructure.

Proposed construction activities (i.e., new target launch pad and fiber optic cable trench) would result in minimal short- and long-term impacts due to soil disturbance. The short-term impacts would include the potential for increased erosion and siltation during construction, while the long-term soil impacts would include compaction and mixing of soil horizons. Soils exposed during construction would be temporarily susceptible to increased erosion caused by wind or rain, but any such erosion would be minor and short lived. Disturbed areas would be controlled to the extent practicable to minimize erosion and sediment runoff. Best management practices, such as silt fences, hay bales, temporary vegetation seeding, and erosion control blankets would be used on all unpaved surfaces that would be disturbed by construction to minimize erosion and siltation of nearby water bodies.

There is potential for soil contamination from spills or leaks from construction equipment, but any impacts would be temporary and localized. Large spills or leaks would be handled according to standard spill response protocol, which includes delineating the extent of the contamination and removing it. Therefore, any potential soil contamination impacts would be contained and would be not significant.

Launch. Target missile launches could cause minor alteration of local soil chemistry as a result of exhaust emissions but would not result in adverse effects on soils. (MDA, 2003a) Therefore no significant impacts on geology and soils are expected from launches of FTF targets from Vandenberg AFB.

Post-launch. No impacts on geology and soils would be expected from debris falling into the ocean due to the depth of the ocean where debris would impact. Inert pieces of debris would be deposited in the ocean and would consist of aluminum, steel, graphite composite, plastic, ceramic, and rubber. These materials would likely sink to the ocean floor; however, they would be unlikely to impact geology and soils in ocean areas.

4.5.1.6 Hazardous Materials and Waste

Pre-Launch. Management of hazardous materials and waste used in and generated from pre-launch pad setup activities for solid propellant targets are described and analyzed in general in the BMDS PEIS. (MDA, 2007a) Potential impacts from hazardous materials would involve their transportation, storage, and use. Potential impacts from hazardous waste would be related to the generation, accumulation, transportation, and disposal of hazardous wastes used or created in FTF Program activities.

The handling and use of hazardous and toxic materials at the launch site during and between launch operations would be limited and would not result in a significant impact. Potentially hazardous materials used for maintenance, grounds keeping, and housekeeping activities would normally consist of fuel (external to those preloaded into the missiles) required for emergency power and heat, various solvents and cleaners, paints and primers, adhesives, and lubricants. Some of the hazardous materials (external to those preloaded into the missiles) that may typically be used as part of missile pad setup activities include coatings, cleaners, solvents, lubricants, and motor and diesel fuel. Most of these materials would be consumed during use, generating minimal waste. If used at a particular facility, fuel for any emergency generators would be stored in dedicated ASTs with secondary containment to minimize potential impacts from spills or leaks. The ASTs would be routinely inspected. In the unlikely event that a spill or release occurs, the use of procedures outlined in the site’s SPCC plan and hazardous materials emergency response plan would ensure that the potential impact would be minimal.

Transportation, storage, and use of hazardous materials and waste management would be conducted in accordance with existing site-specific procedures and all applicable Occupational Health and Safety Administration (OSHA), EPA, DOT, DoD, other U.S. Federal, state, and local regulations and requirements. In addition, Vandenberg AFB would follow established project and launch complex Standard Safety Operating Plans, which outline how that site will manage and minimize potential impacts associated with the storage, use, transportation, and disposal of hazardous materials, petroleum products, and waste.

Hazardous materials used and hazardous wastes generated are similar to hazardous materials and waste already in use and generated in other operations (including standard facility maintenance activities) and represent only a small increase in the total amount of materials to be handled at the site. This small increase could easily be accommodated by the site's current hazardous materials and hazardous waste management systems and would not result in a significant impact.

Substantial impacts on the environment are not expected from the presence of potentially hazardous materials and the generation of wastes during pad setup activities for solid propellant targets. The following hazardous materials management techniques may be used to minimize (1) the amount of hazardous materials stored, (2) the threat of their accidental and unplanned release into the environment, and (3) the quantity of hazardous waste generated.

- No underground tanks would be installed as a result of this activity. Diesel fuel would be stored in ASTs with secondary containment and inspected daily in accordance with the provisions of the site's SPCC plan (as appropriate). ASTs may be removed after tests are complete or put in standby condition at the sites to support future activities. Fueling would follow existing procedures to minimize the potential for fuel spills.
- Bulk hazardous materials ([e.g., 210-liter (55-gallon) drums of anti-freeze, hydraulic fluid, compressed welding gases) would be stored in approved containers that meet National Fire Protection Association industrial fire protection codes and required containment systems.
- Spill response materials (e.g., sorbents, drain covers, mops, brooms, shovels, drum repair materials and tools, warning signs and tapes, and personal protective equipment) would be readily available for use in the event of an unplanned release.
- Storage of hazardous materials would be in protected and controlled areas designed to comply with Vandenberg AFB's SPCC plan.
- Hazardous materials would be inspected before accepting a shipment (e.g., to validate container integrity, expiration date, etc.).
- Hazardous materials would be purchased in appropriately sized containers (e.g., if the material is used by the can, it would be purchased by the can rather than in bulk-sized containers).
- Over-purchasing of hazardous materials would be avoided.
- Hazardous material containers would be appropriately labeled.
- Hazardous waste would be containerized and properly disposed of in accordance with all applicable Federal, state, local, and site-specific requirements.
- All hazardous waste would be transferred by licensed hazardous waste transporters off-site for appropriate treatment or disposal.

Because MDA would follow these and other site-specific SOPs, the impact from hazardous materials and waste used and generated in pre-launch pad setup activities at Vandenberg AFB would be not significant.

Launch. All hazardous materials would be handled and stored in accordance with applicable state and Vandenberg AFB regulations, particularly the Hazardous Materials Management Plan and the Hazardous Waste Management Plan, as well as the chemical Material Safety Data Sheets. Such measures would be designed to minimize hazardous materials impacts to personnel and the environment. (MDA, 2002d) The waste generated by the LPM launch activities would not be substantial and would not result in a substantial increase in the total quantities of hazardous waste generated at Vandenberg.

Hazardous materials and waste would be used and generated as a result of FTF launch procedures for solid propellant targets. Hazardous materials and waste associated with FTF launch activities under the proposed action are not expected to have significant impacts given that the proposed activities would be similar to ongoing activities at the base. To minimize potential hazardous materials/waste impacts, Vandenberg AFB follows standard procedures associated with missile impact zones, debris containment, and cleanup. (MDA, 2002d)

During a target launch, it is possible for a missile booster to detonate or for the propellant to burn but not explode and terminate the launch at the launch site. It is also possible for missile flight to be terminated at the point of or shortly after liftoff, or to be terminated shortly after the missile has left the launch pad. In the event of such a mishap, the incident would be handled as an explosive ordnance event. In accordance with Range Safety Requirements, EWR 17-1, an emergency response team would be on standby near the launch site to ensure immediate response and rapid control in the event of such an occurrence. The emergency response team would consist of Vandenberg AFB's designated on-site contractor or local fire-fighting team as well as site safety, medical, and bio-environmental engineering personnel. Any remaining hazardous materials would be regarded as hazardous waste for management purposes. The resulting hazardous waste would be rendered safe by Explosive Ordnance Disposal personnel and disposed of in accordance with applicable Federal, state, and base requirements. (MDA, 2002d)

Before each launch at Vandenberg AFB, the Safety Office computes a toxic hazard corridor to ensure that surrounding communities are not at risk in the event of a launch anomaly. Only when meteorological conditions indicate this corridor does not extend off the base is the operation allowed to proceed. (MDA, 2002d)

Emergency response would be required in the event of a post-launch event that resulted in the partial destruction of a missile. Such an event could result in the rupture of a rocket engine and exposure of the solid fuel. In the event of such mishap, spillage of the propellants could occur. The incident would be handled as an explosive ordnance event, and remaining potentially hazardous materials would be regarded as hazardous waste for management purposes. Hazardous materials that result from a flight termination would be cleaned up and any contaminated areas remediated. Removal and disposal of nonhazardous and hazardous waste from each launch site would be in accordance with all applicable state and Federal requirements. All personnel involved in these operations would wear protective clothing and receive specialized training in spill containment and cleanup. (MDA, 2002d)

An ESQD would be calculated around the launch site based on the equivalent explosive force of all propellant and pyrotechnic materials contained within the missile. If a launch is terminated after the missile has left the launch pad, then hazardous material would remain within the evacuation zone and there would be minimal impact to personnel and no impact to the public from an accidental release. Any debris would fall within the delineated impact zones. (MDA, 2002d)

Overall, because Vandenberg AFB would follow these and other site-specific SOPs, potential impacts resulting from hazardous materials used or hazardous waste generated during launch activities of solid propellant FTF targets under the proposed action would be not significant.

Post-launch. Post-launch refurbishment and blast residue removal are all routine post-launch activities. During this process, all hazardous materials and associated wastes would be responsibly managed in accordance with the well-established policies and procedures identified in Section 3. All hazardous and non-hazardous wastes, including industrial wastewater from launch pad catchments, would be properly disposed of, in accordance with applicable Federal, state, local, DoD regulations. Hazardous material and waste-handling capacities would not be exceeded, and management programs would not have to change. As a result, no adverse impacts from the management of hazardous materials and waste are expected.

The impacts of post-launch activities resulting from boosters hitting the ocean have been analyzed in the BMDS PEIS. Accordingly, no significant impacts to the ocean environment would be expected from post-launch activities involving liquid propellant missile. During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In freshwater at $20^{o}C$ ($68^{o}F$), it is likely to take over a year for the perchlorate contained in solid propellant to leach out into the water. Lower water temperatures and more saline waters would likely slow the leaching of perchlorate from the solid propellant into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations. (MDA, 2007a) Therefore, post-launch impacts related to hazardous materials and waste are not anticipated to be significant.

4.5.1.7 Health and Safety

Pre-launch. Potential impacts to the health and safety of workers could occur as a result of accidents and exposure to air emissions and hazardous materials handled and hazardous waste generated during proposed site preparation and construction activities. Potential impacts to the health and safety of the public could occur as a result of exposure to air emissions caused by site preparation and construction activities.

General safety procedures would be followed to protect construction workers and launch location employees during site preparation and construction activities. During the site preparation and construction phase, there may be typical construction-related occupational exposures to fugitive dust kicked up from land disturbances and to pollutants emitted from vehicles and earth-moving equipment, including PM, NO_X, SO_X, and CO.

A health and safety plan would be prepared by the contractor and submitted to the Vandenberg AFB administration to ensure the health and safety of on-site workers. A formally trained individual would be appointed to act as safety officer. The appointed individual would be the point of contact on all problems involving job site safety. During performance of work, the contractor must comply with all provisions and procedures prescribed for the control and safety of construction team personnel and visitors to the job site. Compliance with applicable DoD, OSHA, other Federal, state, local, and location-specific health and safety regulations and programs would ensure that site preparation and construction of the launch facilities would not impact the health and safety of workers or launch location personnel.

Impacts to the public would not be significant because, as shown in Section 4.3.2, regional air quality would not be adversely affected by fugitive dust or construction vehicle emissions. Therefore, any potential impacts to the health and safety of on-site workers and the public at and around Vandenberg AFB would be not significant.

As discussed in Section 2.7.2.1, pre-launch pad setup activities for solid propellant targets would consist of final integration of the target, clearing the range area, and other range requirements prior to launch. Additionally, the SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 targets would require the addition of hydrazine to the ACM ACS prior to launch. Potential health and safety impacts to launch location workers from pad setup activities include impacts due to handling hazardous materials (including explosives) or from accidents. Potential health and safety impacts to the public from pad setup activities include impacts from accidents.

All FTF pre-launch worker operations will be governed by established DoD, other Federal, state, local, and location-specific health and safety regulations and programs. All handling of explosives at Vandenberg AFB would require implementation of written procedures which have been approved by the Safety Office and must be conducted under the supervision of an approved ordnance officer using explosive-certified personnel. Storage areas would be fenced, and appropriate placards would be used. All storage and handling of explosives by location personnel is required to take place in facilities designed to handle explosives and which have been sited in accordance with applicable safety requirements. These regulations specify the required ESQDs for a facility to ensure safety to workers and the public in the event of explosion, based upon the maximum quantity of explosive material permitted for the facility. Proper siting would prevent a chain-reaction where each explosion initiates explosions in adjacent storage facilities.

Access to launch support structures and hazardous materials storage areas would be limited to mission essential personnel. All personnel associated with FTF launches would be properly trained in compliance with applicable health and safety procedures and guidelines. Safety zones, appropriate personal protective equipment, and copies of material data safety sheets would be available to all workers. Launch facilities would have fire protection equipment and would be inspected and maintained according to IFC 2000, 40 CFR 264, and other applicable standards.

A pre-launch accident on the launcher would be characterized by an explosion and/or a detonation of missile propellants or burning of the propellants without an explosion or detonation. An ESQD surrounding the launcher would be calculated based on the equivalent explosive force of all propellant and pyrotechnic materials contained on the flight vehicle. Areas outside the ESQD zone provide acceptable protection to workers and the public and require that areas inside the ESQD zone be cleared of non-mission-essential personnel. The ESQD would vary from based on the size of the target.

Because pre-launch pad setup activities would be conducted in accordance with all established safety regulations and operating plans and protocols, the potential impacts on the health and safety of on-site launch workers would be not significant. Since public access to the launch locations is limited, and since ESQDs would be established around storage areas, no impact to public health and safety would be expected.

The SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 targets would require onsite loading of hydrazine into the ACM ACS prior to launch. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area. Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any small leaks/spills would be contained in a drip pan partially filled with water. Water would be added to larger leaks/spills to dilute the hydrazine and moist absorbent pads/booms would be used to contain and isolate the release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release. No impact on the general public would be expected.

Launch. Adverse health and safety impacts from launches of liquid propellant targets from Vandenberg AFB are expected to be not significant. Implementation of standard safety procedures and the similarity to current operations reduce the potential for safety hazards. LHAs and surface danger zones would be established to minimize the potential for health and safety impacts during launches. (MDA, 2002d) Therefore, impacts on health and safety from launches of liquid propellant targets at Vandenberg AFB would be not significant.

Prior to each launch, impact zones for the launch would be delineated based on detailed launch planning and trajectory modeling. This modeling would include analysis and identification of a flight corridor. Launches would be conducted when trajectory modeling verifies that the target and debris would be contained within predetermined areas. The standard operating and safety procedures would be tailored for each specific mission as necessary. Launch locations would coordinate launch operations with the FAA, U.S. Coast Guard, and appropriate state agencies and issue NOTAMs and NOTMARs before launches to ensure public health and safety in the air and on the water. Non-mission-essential personnel would be excluded from the LHA during launch operations. Flight testing evacuations, clearances, and road closures would be implemented as necessary to ensure both worker and public health and safety.

Evacuation includes conducting ground, BOA, and air surveillance sweeps as appropriate for each location to ensure that all areas are evacuated. (MDA, 2007a) Implementation of these procedures for missile launches and tests would minimize the risk of any adverse health or safety impacts on workers and the public associated with conducting FTF target launches.

Appropriate health and safety SOPs would be developed to protect personnel. Every reasonable precaution would be taken during the planning and execution of a launch to prevent injuries.

A written procedure for all explosive activities is required and must be approved by the appropriate range authorities. Established procedures to prohibit access to restricted areas would be followed. The restricted areas are based upon the probability of potential hazards involved with malfunction during launches and would include

- The impact limit line, which sets the boundary protection line for all non-mission essential personnel;
- The launch caution corridor, an area limited to essential personnel;

- The LHA, an area around the launch point limited to essential personnel in hardened facilities; and
- The stage or booster impact area.

Impact zones for each launch would be delineated based on detailed launch planning and trajectory modeling, which would include analysis and identification of a flight corridor. Flights would be conducted when trajectory modeling verifies that launch-related debris would be contained within predetermined areas, all of which would be located away from inhabited land and populated areas. (MDA, 2007a)

Launch-related personnel that would be exposed to noise in excess of applicable standards including OSHA regulation 1910.95 would be required to wear appropriate hearing protection, which would reduce the noise levels to prescribed health and safety levels. (MDA, 2007a)

Because Vandenberg AFB would follow these and other site-specific SOPs, potential impacts to the health and safety of workers or the public due to launch activities of solid propellant FTF targets under the proposed action would be not significant.

Post-launch. Post-launch refurbishment and blast residue removal are routine operations at a launch site. All applicable Federal, state, and local health and safety requirements, such as OSHA regulations, would be followed, as well as all appropriate DoD regulations. By adhering to the established safety standards and procedures identified in Section 3, the level of risk to military personnel, contractors, and the general public would be minimal. Consequently, no significant impacts on health and safety are expected.

There is the potential for impact of debris from FTF boosters at any point along the flight corridor due to missile malfunction and/or termination of a missile flight by the FTS. The resulting debris would follow a ballistic trajectory and would impact in designated impact areas in the ocean. Because an exact point of termination cannot be determined, the potential effects footprint is determined by considering the limits of debris fallout based on destruction of a target at the boundaries of the acceptable flight corridor, along with additional flight time based on the time required to initiate the FTS. (MDA, 2007a) The possibility of debris hitting the ground or water outside the designated impact area is remote; and therefore, safety impacts of flight termination would not be significant. Debris modeling and analysis would be conducted for specific proposed activities as appropriate.

4.5.1.8 Land Use

Pre-Launch. Potential impacts on land use from site preparation and construction would be related to new construction activities and any restricted access to land associated with the new facilities and infrastructure.

The proposed site preparation and construction at Vandenberg AFB would occur in previously disturbed areas adjacent to existing military and commercial launch facilities. The areas proposed for construction do not contain unique or prime farmland protected under the FPPA and would not result in an adverse land use impact. All of the proposed construction would take place on property owned or designated for use by the range/launch facility and would not cause any change in any use of land outside of the property boundaries. No public access to parks, popular visitor destination points, or recreation areas, including water-oriented recreational activities would be restricted due to the proposed construction.

The immediate vicinity of the construction zone would be temporarily affected by limiting access to only necessary personnel. Nevertheless, such activity would be of short duration and considered normal range/launch facility activity that is consistent with the base's general land use. The proposed site preparation and construction is entirely consistent with Vandenberg AFB's mission and would occur in accordance with existing land use plans, agreements, policies, and controls, resulting in no significant impacts.

Launch. Planning and execution of launches would be in compliance with Federal, state, local, and range land use requirements. Proposed activities would be compatible with the coastal consistency requirements. Closures of recreational areas and adjacent parks would continue during periods of hazardous operation. To minimize potential land use conflicts, coastline, beach, and recreational area availability would continue to be made known to the public through various local media sources. (MDA, 2003a) Therefore, impacts on land use from launches of targets from Vandenberg AFB are not expected to be significant.

Post-launch. Post-launch activities would be confined to areas currently used for launch activities and therefore would have no impact on land use.

4.5.1.9 Noise

Pre-launch. The proposed construction activities at Vandenberg AFB are minor and would not occur in areas that are currently pristine and noiseless. Construction at these locations would be temporary in nature and similar to any commercial construction site. Noise generated during construction should have minimal impact to offsite areas. Impacts to wildlife due to noise are discussed in the biological resources section above.

Noise from site preparation and construction activities would comply with OSHA, applicable DoD Health and Safety regulations and guidelines, Range Safety Requirements, and other recognized standards for operations that involve construction or facility modifications. Restricted public access to the proposed project sites would be ensured through use of signs and fencing. Contractors would prepare and submit to the base a health and safety plan requiring the use of hearing protection, when appropriate, to ensure the health and safety of onsite workers.

Because Vandenberg AFB would follow these and other site-specific SOPs to mitigate any impacts due to site preparation and construction activities, impacts from noise are not anticipated to be significant.

Launch. Noise impacts from launches of Peacekeeper missiles have been previously analyzed at Vandenberg AFB. The largest FTF target proposed for launch at Vandenberg is the LV-3, which is smaller in size than the Peacekeeper missile. LV-3 launch noise level is expected to fall within or below the noise level of previously measured Peacekeeper launches because of the LV-3's smaller size. It is therefore anticipated that noise impacts for launches of FTF targets would also fall within OSHA limits. The flight patterns of FTF launches would be over the open ocean area and would not cross populated areas. Noise impacts from launches would be short-term and infrequent. Based on these results and compliance with regulations, the proposed launches would not cause or contribute to noise impacts.

In addition to the noise of the rocket engine, sonic booms are possible. However, FTF launches would be in a western direction and would not occur over land. They are not expected to impact Vandenberg AFB or surrounding communities. Vessels impacted by sonic booms would be expected to experience sound resembling mild thunder. (MDA, 2003a) Therefore, impacts from launch noise at Vandenberg AFB would not be expected to be significant.

Post-launch. Because of the limited activities associated with post-launch operations, limited amounts of noise would be generated. Thus, no impacts on ambient noise levels would be expected.

4.5.1.10 Socioeconomic and Environmental Justice

Pre-Launch. Potential socioeconomic impacts associated with the site preparation and construction activities at Vandenberg AFB could occur as the result of the influx of temporary construction personnel to Santa Barbara County. Potential impacts on environmental justice and children's health would not be expected to occur as a result of the site preparation and construction activities at Vandenberg AFB for FTF targets.

Approximately 50 construction personnel would be required at Vandenberg AFB during the course of construction of the fiber optic cable trench and infrastructure modifications. The housing needs of the additional personnel during site preparation and construction would be met via local hotels and guesthouses and would not result in a significant socioeconomic impact. The additional construction personnel, by spending money in the local economy via procurement of goods and services, would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local community. The overall impact would be slight and would not cause any population growth. The proposed site preparation and construction activities would not cause displacement or other significant impacts to populations, residences, or local businesses within Santa Barbara County.

Launch. Up to four target launches per year would occur at Vandenberg AFB under the proposed action. A typical ramp up over a three-month period would be 25, 75, and 150 personnel who would be required to support a target launch. After a launch, some of these personnel would immediately depart Vandenberg AFB. As part of pre-launch and flight activities, an LHA would be established around the launch site. The LHA would result in certain areas of Vandenberg AFB being cleared of personnel in the event of an accident during interceptor launch. Similarly, certain sea-surface areas would also have to be cleared. While the closure areas in question are significant in size, their nature is decidedly temporary; land areas would need to be cleared approximately one hour before a launch, with sea surface areas cleared approximately four hours before a launch. The actual launch is expected to last approximately 30 minutes. Upon the Range Safety Officer declaring the area safe after a launch, expected to be within hours, the areas can then be reoccupied. Also, the notice given to the local communities via local newspapers, broadcast media, and commercial fishing and tourist boat trade associations would be extensive. As such, entities with an economic interest in the use of these areas such as the commercial fishing and tourist industries would not be significantly impacted by the proposed clearance areas.

Activities related to the implementation of the FTF Program would not cause any displacement of populations, residences, or businesses within the areas surrounding Vandenberg AFB. There are numerous hotels and motels situated within the surrounding cities of Lompoc, Santa Maria, and Guadalupe, and the availability of temporary accommodation is considered to be adequate.

By spending money in the local economy, mainly via accommodation and procurement of goods and services, the additional personnel would represent both a potential increase in local service based employment opportunities and a small but positive temporary economic impact to the local communities. The overall impact would, however, be slight and would not cause any population growth. No significant impacts on locally significant businesses or industries such as services, agriculture or manufacturing are anticipated during operational activities. (MDA, 2003a) Therefore, no significant socioeconomic or environmental justice impacts would occur on Vandenberg AFB or in its surrounding communities due to the proposed action.

Post-launch. No impacts are expected on socioeconomics and environmental justice from post-launch activities.

4.5.1.11 Transportation and Infrastructure

Pre-launch. As described in Section 2.6, transportation of the FTF components and support equipment to Vandenberg AFB would be accomplished by truck to Redstone Arsenal and then by aircraft to the on-base air field and then over road to the destination launch location by truck. These modes of missile transport are routine at Vandenberg AFB, and there would be no impacts to ongoing base operations. Increased flights for FTF target shipments are not anticipated to affect air transportation to or from Vandenberg AFB. Transportation procedures would comply with FAA, DOT, OSHA, applicable DoD, and local safety and transportation regulations. All target components would be packaged in appropriately designed containers, labeled, and handled in accordance with applicable DOT regulations for the transport of hazardous materials. Trained personnel using only appropriately certified cranes and other materiel-handling equipment would handle target components and handling equipment in accordance with approved SOPs. These procedures would minimize the potential for accidents, as well as provide the means of mitigating potential adverse effects should an accident occur.

Rail traffic would not be affected by FTF air transportation activities.
Any necessary disruption due to military convoys or road blocks would be temporary and infrequent. Up to four FTF missions per year would be expected. These limited events would not have any substantial impact on existing transportation patterns or volume on or off the base. Any disruption would be of short duration and would not be expected to have a significant impact on transportation.

Section 2.7.5.1 describes proposed site preparation and construction activities for Vandenberg AFB. The construction equipment, materials, and personnel would be brought to Vandenberg by air or road. Impacts on transportation from site preparation and construction activities would be minimal and not significant.

Launch. Impacts on transportation at Vandenberg AFB from launches of FTF targets could occur as a result of temporarily stopping ground, air, and marine traffic during the launches. Ground, air, and marine transportation have been interrupted at Vandenberg AFB in conjunction with other DoD programs in the past and the proposed FTF launch activities would be considered normal usage of the base. Once an FTF launch is scheduled, there would be a standard sequence of notification and coordination procedures between each location's Range Safety Office and the agencies (FAA, U.S.

Coast Guard, local agencies) that would enforce the clearance of land, air, and sea areas. Clearances would be of a short duration, and effects are anticipated to be negligible.

For impact limit lines that extend outside of Vandenberg AFB's boundaries, an agreement would be made with the appropriate landowners to control the use of these areas during launches. 30 SW/SE and the 30th Range Squadron Airspace and Offshore Management Section would oversee evacuations of surrounding land and water users. (MDA, 2002e)

Passenger and freight trains also travel frequently through Vandenberg AFB. Vandenberg AFB maintains strict policy not to launch over trains due to potential risk to people and property, which is implemented by close communication between the base and train engineers. (MDA, 2002e) Since this is done on a regular basis already, impacts are expected to be not significant.

Potential impacts to air transportation are discussed in the Airspace section above and are expected to be not significant.

Sea-surface areas that would have to be cleared include the LHA that extends over water, the predicted booster drop zones, the predicted debris impact area, and the predicted whole body miss impact point for each missile. Sea-surface areas would be cleared with the cooperation of the U.S. Coast Guard. Before a missile launch, Range Safety officials at each location would issue NOTMARs that would identify areas to avoid and the times that avoidance of those areas is advised. Therefore, no impacts on marine traffic would occur as a result of the Proposed Action.

Post-launch. Debris from boosters may fall into waters normally used for commercial shipping. The majority of international trade uses routes of least distance. The actual debris impact area for boosters would be small and would depend upon the individual flight path. Prior warning of proposed launch activities through issuances of NOTMARs would enable commercial shipping to follow alternative routes away from the proposed debris impact area.

4.5.1.12 Visual Resources

Pre-Launch. Potential impacts on visual resources could occur as a result of construction of a fiber optic cable trench, the installation of a lightning protection system, and minor infrastructure modifications at the TP-01 launch site. Construction would occur only in the daytime, which precludes any impacts to visual resources due to nighttime lighting.

The proposed construction would place additional man-made structures within an area already designated and developed as a military and commercial launch facility. Although certain areas at Vandenberg AFB, particularly along the coast, may be considered regionally scenic, the natural visual landscape of the area has already been altered by the existing buildings and launch infrastructure. Sensitive viewers are not likely to be in the area given that it is an active military base and that the proposed TP-01 launch site is well within the boundaries of Vandenberg AFB away from any local public access points. Because the new infrastructure would be placed in a previously altered visual landscape adjacent to existing launch facilities, impacts on visual resources at Vandenberg AFB are expected to be not significant.

Launch. Based on the brevity of launch events and the infrequency of FTF target launches proposed at Vandenberg AFB, target launches would not significantly impact the visual landscape at Vandenberg.

Post-launch. No post-launch activities would be expected to affect visual resources.

4.5.1.13 Water Resources

Pre-Launch. Ground disturbing activities during construction of a 5.6 kilometer (3.5 mile) long fiber optic cable trench could result in short-term adverse water quality impacts to nearby surface waters. Potential impacts include increased soil erosion, siltation, and turbidity levels in receiving waters as well as impacts from accidental spills of the materials used during construction procedures or by construction vehicles, including fuel, cement, paint, anti-freeze, oil, etc.

The installation of a lightning protection system, metal tie downs to support the CE, and a new gate in an existing fence would not result in significant impacts on water quality because these activities would occur within the footprint of the launch pad, requiring little to no additional ground disturbance. The creation of new impermeable surfaces for Building 1894 and the parking lot at the Technical Support Center would not result in significant impacts to water resources because it would be designed to maintain existing surface water drainage patterns and prevent erosion.

Any applicable permits would be obtained and spill response protocols would be developed before commencing construction. Best management practices and other SOPs would be used during site preparation and construction activities to minimize erosion, storm water pollution, and other types of impacts that could adversely impact surface water quality. Conformance with Vandenberg AFB's SOPs and California best management practices for construction would be expected to minimize the magnitude of adverse surface water quality impacts. Only minor erosion and turbidity impacts, and insignificant and accidental spillage of petroleum products and other construction-related materials may occur.

Ground water would not be adversely impacted by proposed site preparation or construction activities. Ground water would not be directly encountered during construction excavation activities and incidental spills or leaks from construction equipment would not be expected to reach groundwater level.

The proposed site preparation and construction has the potential for indirect impacts to wetlands in the vicinity of the proposed fiber optic cable trench. Indirect impacts can be caused by disturbance to adjacent land that results in degradation of water quality from chemical or sedimentary runoff. However, the trench would be located in previously disturbed areas of soil (usually along the shoulders of existing roads) and would avoid wetland areas. In addition, the implementation of appropriate techniques to control runoff and other Best Management Practices would minimize potential impacts to water quality, therefore impacts to wetlands, ground water, and surface water resources at Vandenberg AFB would not be significant.

Launch. Impacts on water resources from launches of solid propellant Peacekeeper missiles at Vandenberg AFB have been previously analyzed in the GMD ETR EIS. (MDA, 2003a) Because propellant amounts and emissions from the largest FTF target proposed for launch at Vandenberg (i.e., the LV-3) would be less than those of Peacekeeper missiles, impacts to water resources from launches of FTF targets would be expected to be similar to or less than impacts from launches of Peacekeeper missiles. The GMD ETR EIS concluded that deposition of rocket emission products onto surrounding surface waters would occur as a result of target missile launches but that those impacts would not be significant. Therefore, impacts on water resources from launches of solid propellant FTF targets would be expected to be not significant.

In the unlikely event of an early flight termination, deposition of liquid propellant and missile debris could occur in water bodies. However, the probability of any individual water body, spring, or creek being directly impacted is extremely low. Oxidizer and initiator fuel would volatilize into the atmosphere. Any residual nitric acid from the release of IRFNA would not appreciably affect ground water. In the highly unlikely event that propellants are deposited in surface water, residual nitric acid would cause a substantial, short-term pH change. The acid would mix with the water and eventually be neutralized and diluted. Coal tar distillate fuel would not mix with water, but would form a slick on the surface that would stick to surfaces it contacts. Hydrazine fuels would degrade primarily into nitrogen gas and water over a period of hours to weeks. Spill prevention, containment, and control measures would prevent or minimize impacts to water resources from accidental spill or a launch anomaly. (MDA, 2002d) Therefore, impacts on water resources from launches of liquid propellant targets are expected to be not significant.

Post-launch. Post-launch activities are not expected to have any impacts on water resources.

4.5.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Because Vandenberg AFB is a location proposed to support the land launch of FTF targets and would not serve as a staging location for air-based launches, potential environmental impacts to all resource areas from the launch of FTF targets from Vandenberg AFB would be the same under alternative 1 as under the proposed action.

4.5.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. No construction or site-preparation activities would occur in support of the proposed action at Vandenberg AFB. Pre-launch, launch, and post-launch activities involving SR19/SR73, LV-2, or LV-3 would not occur from Vandenberg AFB as proposed. MDA would continue to launch those target configurations from Vandenberg AFB addressed in existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at Vandenberg from the proposed action and existing planned launch activities would continue to occur.

4.6 United States Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site

Pre-launch, launch, and post-launch activities at USAKA/RTS for the proposed action would occur as described in Sections 2.6, 2.7.2.1, 2.7.3.1, 2.7.4.1, and 2.7.5.1. Activities for alternative 1 and the no action alternative would occur as described in Sections 2.8 and 2.9. Up to one launch per year could occur at USAKA/RTS from Launch Hill on Meck Island. Pre-launch site preparation and construction activities would only occur at Launch Hill on Meck Island to support the proposed FTF Program.

Many of the pre-launch, launch, and post-launch activities described in these sections are routine actions at USAKA/RTS that have been previously analyzed and found to have no significant impact. Pre-launch site preparation and construction activities will have no impact on airspace or hazardous materials and waste at USAKA/RTS. Pre-launch pad setup activities may have the potential to impact hazardous waste and health and safety at USAKA/RTS and therefore are analyzed in this EA; however, no significant impact is anticipated for any other resource areas from these activities. Launches of liquid propellant targets would not take place at USAKA/RTS and therefore would have no impact. Launches of solid propellant targets are routine activities and are not expected to have an impact on airspace, biological, cultural, geology and soils, land use, noise, socioeconomics and environmental justice, or visual resources. Post launch activities have been previously analyzed and found to have no significant impacts at USAKA/RTS on any resource areas.

Documents that have previously analyzed these activities in these resource areas at USAKA/RTS include: Mobile Sensors EA (MDA, 2005), Courtland EA (MDA, 2006), TMD ETR EIS (SSDC, 1994a), GMD ETR EIS (MDA, 2003a), PATRIOT Advanced Capability-3 (PAC-3) Lifecycle EA (SSDC, 1997), Final Supplemental EIS on Proposed Actions at U.S. Army Kwajalein Atoll (SSDC, 1993), USAKA Temporary ETR EA (SSDC, 1995a). The findings of these documents are summarized below and any impacts specific to the FTF Program are discussed in the appropriate sections.

General, non site-specific impacts of many of the activities described in this EA have been analyzed in the BMDS PEIS. (MDA, 2007a) The site-specific analyses and impacts described in this EA tier from those general analyses in the BMDS PEIS.

4.6.1 Proposed Action

4.6.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to USAKA/RTS could occur from truck and air transportation of the target to the launch location.

As described in Section 2.6, a maximum of one roundtrip target shipment per year to and from USAKA/RTS and the launch site at Meck Island would occur under the proposed action. One roundtrip shipment would increase the number of landings and takeoffs at USAKA/RTS airport by up to a maximum of 16 extra flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that one FTF launch would occur at USAKA/RTS each year, the maximum amount of annual emissions at USAKA/RTS airport due to aircraft transport would be 0.087 metric tons (0.096 tons) of HC, 0.35 metric tons (0.38 tons) of CO, 0.44 metric tons (0.49 tons) of NO_X, and 0.016 metric tons (0.017 tons) of SO_2. A previous study found that pollutant concentration levels at Kwajalein Island (where the USAKA/RTS airport is located) are lower than the Federal NAAQS for SO_2, Pb, and PM_{10} and below the California state AAQS for NO_2. However, the study did find that downwind concentrations were greater than the 8-hour NAAQS for CO. The UES states that the ambient air quality concentrations for criteria pollutants shall not exceed 80% of the National Ambient Air Quality Standards or increase ambient air concentrations above the baseline level by more than an increment of 25% of the U.S. Ambient Air Quality Standards for the criteria pollutant. The total emissions from air transport shipments of

FTF targets to and from USAKA/RTS airport would be below any Federal *de minimis* quantities; therefore, emissions of criteria pollutants would not be expected to cause an increase in ambient air concentration above baseline levels, or exceed 80% of the NAAQS. The emissions from the additional flights to and from Kwajalein Island on USAKA/RTS would not cause a significant impact on air quality.

Once at Kwajalein, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel less than 8 kilometers (5 miles) over local government-controlled roads, and 29 kilometer (18 miles) over sea by barge, to the launch site on Meck Island. Vehicles would be turned off while on the barge, and therefore no emissions from these vehicles would occur during sea transportation to Meck Island. Exhibit 4-14 presents the estimated emissions per mile for each truck during ground transportation.

Exhibit 4-14. Ground Transportation Emissions USAKA/RTS

Pollutant	Emissions, Grams per Mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year, metric tons (tons)
VOC	1.100	0.000011 (0.000012)	0.00013 (0.00014)
CO	6.461	0.000065 (0.000072)	0.00078 (0.00086)
NO_X	15.434	0.00015 (0.00017)	0.0018 (0.002)
PM_{10}	0.316	0.0000032 (0.0000035)	0.000038 (0.000042)
SO_2	0.346	0.0000035 (0.0000039)	0.000042 (0.000046)

[1] The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to total 10 miles

The increased emissions from an additional 12 trucks one time per year traveling a maximum of 16 kilometers (10 miles) would be quite small as indicated in Exhibit 4-14. The estimated emissions from trucks transporting the FTF target and its supporting equipment from the USAKA/RTS airport to the launch location would be significantly below the Federal *de minimis* levels for all pollutants. Emissions of criteria pollutants would not be expected to cause an increase in ambient air concentration above baseline levels, or exceed 80% of the NAAQS. Therefore, air quality impacts from emissions from ground transportation vehicles at USAKA/RTS associated with the proposed action would be not significant.

Pre-Launch. Impacts on air quality from pre-launch activities on Meck Island at USAKA/RTS could occur from physical site preparation and construction activities and pad setup activities preparing the targets for launch. Excavating a cut in the side of Launch Hill to construct concrete stairs up the hill, replacing old concrete at the launch pad, constructing a new concrete decontamination pad, and constructing a new concrete approach to Building 5050 would disturb approximately 0.03 hectare (0.08 acre) of soil. It is projected that construction would take less than 10 months to complete. Potential impacts include increased PM_{10} from construction-related activities and exhaust emissions (e.g., CO, NO_X, VOCs, PM_{10}, and SO_X) from construction equipment and related vehicles.

Based on the 1995 EPA study described in Section 4.4.1.1, the disturbance of 0.03 hectare (0.08 acre) of soil over 8 months[9] would result in 0.65 metric tons (0.72 tons) of fugitive dust emissions. Standard fugitive dust reduction measures would be implemented, and it was conservatively estimated that dust control measures would be 50 percent effective and that PM_{10} would comprise 50 percent of the total fugitive dust emissions. Water trucks might be used to dampen soil to minimize dust by releasing water or another biodegradable dust suppressant. The speed of construction vehicles would be restricted to limit soil separation into dust, and any soil stockpiled as fill material would be covered until use to prevent moisture evaporation and separation induced by wind. Therefore the total estimated PM_{10} emissions from ground-disturbing activities on Meck Island at USAKA/RTS would be 0.16 metric tons (0.18 tons).

The same types of construction equipment and vehicles would be used at USAKA/RTS as were described for Vandenberg AFB in Section 4.4.1.1. For the purposes of analysis, it was conservatively assumed that the construction vehicles would be active 10 hours per day for the estimated 160 days of construction. The daily emissions from typical construction equipment and vehicles for CO, VOCs, NO_X, SO_X, and PM_{10} are presented in Exhibits 4-10 and 4-11. For the 160 days of construction estimated for USAKA/RTS, the total emissions for all construction equipment and vehicles would be 10.2 metric tons (11.2 tons) of CO, 1.1 metric tons (1.2 tons) of VOCs, 24.1 metric tons (26.6 tons) of NO_X, 2.3 metric tons (2.5 tons) of SO_X, and 0.75 metric tons (0.83 tons) of PM_{10}. Proper tuning and maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance. The total PM_{10} emissions from all ground-disturbing activities and from all construction-related vehicles and equipment would be 0.9 metric ton (1.0 ton).

As described in Section 3.5, emissions from Meck Island are predicted to be far fewer than those from Kwajalein Island, therefore air quality on the island is assumed to be in attainment for all Federal NAAQS. The total emissions from ground-disturbing activities and from all construction-related vehicles and equipment would be considerably below any Federal *de minimis* levels, and therefore would not be expected to cause to cause an increase in the ambient air concentration of any critical pollutant above baseline levels, or exceed 80% of the NAAQS.. Construction would be conducted in accordance with all applicable laws and regulations. While construction would cause a slight increase in

[9] Although total construction time would be expected to take less than 10 months, only eight months were assumed to require ground-disturbing activities. Assuming there are four work-weeks per month, and that each work-week consisted of five days, the total number of construction days would be 160.

some air pollutants, the impact would be both temporary and localized. Once construction ceased, air quality would return to its former level. Therefore the impacts from site preparation and construction activities at USAKA/RTS would be not significant.

Previous studies have found that the air quality at Kwajalein Island is good and have predicted that air quality at Meck Island (where launches would occur) is also good. Studies have found that Kwajalein would be in attainment for SO_2, Pb, and PM_{10} NAAQS. Kwajalein Island would also be in attainment for California's 1-hour AAQS for NO_2. Kwajalein is also below the 1-hour NAAQS for CO, but downwind concentrations were greater than the 8-hour NAAQS for CO. However, previous analyses also predict that emissions at Meck Island are far less than those at Kwajalein Island because Meck Island has less activity. Previous analyses of impacts on air quality from pre-launch pad setup activities have concluded that impacts would be not significant.

Launch. The GMD ETR EIS analyzed the launch of launch of a ground-based interceptor (GBI) from USAKA/RTS with a propellant mass of 20,500 kilograms (45,195 pounds). The launch of dual Orion GBI was predicted to emit 9.6 metric tons of CO (10.6 tons), 9.6 metric tons HCl (10.6 tons), and 16.3 metric tons Al_2O_3 (17.9 tons). The launch of dual Orion GBI has a similar propellant mass to the LV-3. The GMD ETR EIS concluded that the proposed GBI would not be expected to cause a significant impact to regional air quality surrounding RTS. (MDA, 2003a) The launch of LV-3 from USAKA/RTS would be expected to have similar impacts to air quality as dual Orion GBI launches and therefore would not be expected to cause a significant impact on the air quality near USAKA/RTS. Emissions of criteria pollutants would not be expected to cause an increase in ambient air concentration above baseline levels, or exceed 80% of the NAAQS.

The potential environmental impact of land launches of solid propellant targets are considered insignificant. Because the booster is moving away from the point of launch, only a small portion of the launch exhaust would be emitted near the launch area. The moderate to high ocean winds at USAKA/RTS tend to disperse ground level emissions and therefore USAKA/RTS experiences a low concentration of air emissions from missile launches. Launch activities would not be expected to bring any new stationary emission sources to the launch area; therefore, new permits or changes to existing air permits would not be required. Launch/flight activities can contribute to global warming through the emission of greenhouse gases. These emissions could include water vapor and CO_2. However, launch/flight activities would not contribute significantly to the total emissions of these gases, and so would not have a significant effect.

Target launches are short-term, discrete events, allowing time between launches for emissions to be dispersed. The prevailing winds at USAKA/RTS would quickly sweep away any pollutant emissions. Therefore impacts on air quality from launches of solid and liquid propellant targets would be not significant.

Post-launch. Any post-launch refurbishment activities would meet all applicable rules for VOCs. No air emission permits are required for these operations. With the exception of some minor, localized increases in particulate matter from the occasional brushing of blast residues from the launch tube walls, if necessary, and launch stools, no adverse effects on air quality are expected.

The impacts on air quality from post-launch activities resulting in boosters hitting the ocean have been analyzed in the BMDS PEIS. Impacts would be similar to, but less than those impacts for boosters hitting land because the residual liquid propellants would be released into the ocean rather than the air. Solid propellant, if still in the casing, might continue to burn for some time even under water, possibly impacting air quality. (MDA, 2007a) Because FTF targets would also impact the BOA, impacts would be similar to those discussed in the BMDS PEIS, and minimal impacts on air quality would be expected.

4.6.1.2 Airspace

Pre-launch. Impacts on airspace from pre-launch activities at USAKA/RTS could occur from air transportation of the targets to the launch location.

Previous analyses have determined that an increase in air transportation operations could affect the airspace of the location where such activities would occur. These documents concluded that, because all operations involving air transportation of targets would be performed in accordance with existing airspace use requirements, impacts on the airspace in all locations would be not significant. Because air transportation related to FTF target launch from USAKA/RTS would be in accordance with both existing airspace use requirements and USAKA/RTS standard operating procedures, no adverse impacts on airspace would be expected.

There would be no impact on airspace from pre-launch site-preparation and construction, preparation of the launch site for arrival of the target, short term storage of the target (if necessary), and setting the target on the launch stand, because these activities do not physically interfere with navigable airspace or affect airspace scheduling.

Launch. The USAKA range is located under international airspace and therefore, has no formal airspace restrictions governing it. Launch activities would be coordinated with the Central Air Reservation Facility and the Oakland ARTCC Oceanic Control-5 Sector and would be governed by procedures of the ICAO. This coordination would minimize the potential for impacts to regional airspace. Before launches from Meck Island, NOTAMs would be sent in accordance with applicable directives. Because of these notices and coordination, impacts on regional airspace due to launches of FTF targets would be not significant.

Post-launch. If debris from FTF boosters falls into the ocean, MDA would not recover the debris. Therefore, helicopters and other equipment would not be used, and no impacts on airspace would be expected.

4.6.1.3 Biological Resources

Pre-Launch. Site preparation and construction activities on Meck Island at USAKA/RTS would result in little to no impact on biological resources because they would occur within the footprint of existing infrastructure, requiring little to no additional ground disturbance. The combination of increased noise levels and human activity would likely displace some small mammals and birds that forage, feed, nest, or have dens in proximity to proposed construction areas. However, sufficient foraging and feeding habitat occurs in adjacent areas to accommodate potentially displaced wildlife. Disturbance from equipment noise and temporary increase in personnel would be brief and is not expected to have a significant adverse effect on resident wildlife species or migratory bird populations.

Launch. Meck Island has been extensively altered by human activity. Little native vegetation is found on the island to serve as wildlife habitat. Several small areas suitable for seabird nesting and roosting are present on the island. Noise associated with one additional launch per year from Meck Island could cause seabirds to temporarily leave their nests, but they are likely to return to normal behavior within a short time after the launch. Air emissions from launches should not affect the seabird nesting area because the prevailing trade winds would carry any ground level concentrations of emissions away from that area. (SSDC, 1993)

Within two hours of the launch, personnel would survey the shoreline within 100 meters (328 feet) on both sides of the launch site to determine whether sea turtles are present in the water or hauling out at this area. If turtles or turtle nests are observed in the area, personnel would consult with USAKA Environmental. USAKA Environmental would subsequently consult with the appropriate UES agencies, before continuing with launch activities. As soon as possible after the launch, personnel would survey the shoreline along both sides of the launch site to identify any possible environmental impacts from the launch. The survey and any mitigation measures would be documented and readily available for inspection. Therefore, there would be no significant impacts on the Island's biological resources.

Post-launch. The intermittent movement of trucks and any repair/cleanup/waste-handling equipment would not produce substantial levels of noise, and vehicles normally would remain on paved or gravel areas. Thus, the limited actions associated with post-launch operations would have no adverse effects on local vegetation or wildlife, including threatened and endangered species, and critical and other environmentally sensitive habitats.

The biological impacts of post-launch activities resulting in motors and boosters hitting the ocean have been analyzed in the BMDS PEIS. Expended motors and boosters hitting the ocean surface would impart a considerable amount of kinetic energy to the ocean water upon impact. For example, interceptors would hit the water with speeds of 91 to 914 meters (300 to 3,000 feet) per second. The shock wave from their impact with the water would be similar to that produced by explosives. Depending on the water depth, strong waves from the impact may detach kelp strands from the sea floor. During successful missions, boosters would impact in deep open ocean waters. At close ranges, injuries to marine mammal internal organs and tissues would likely result. However, the density of marine species including marine mammals generally decreases, and the corresponding probability of impact decreases, as the distance from the shore increases. Injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 (6 in 10,000) marine mammals exposed per year). (MDA, 2007a) Due to the infrequency of proposed FTF launches and the low probability of marine mammal injury, the proposed action would not be expected to adversely impact marine mammals.

The parts of solid rocket motor propellant expelled from a destroyed or exploded rocket motor that fall into the ocean would most likely sink to the ocean floor at depths of thousands of meters. At such depths, the propellant parts would be located away from feeding marine mammals. (MDA, 2007a) Therefore, marine animals would not be impacted from ingesting solid propellant associated with FTF targets.

4.6.1.4 Cultural Resources

Pre-Launch. Proposed site preparation and construction activities on Meck Island at USAKA/RTS could potentially impact cultural resources. Cultural resource surveys of Meck Island have not identified any unique paleontological, archaeological, or traditional Marshallese cultural resources. The surveys also noted that extensive past construction and ground-disturbance over the entire island make it highly unlikely that intact archaeological or cultural resources would be discovered.

Thirteen Cold War-era facilities on Meck Island are considered potentially eligible for inclusion on the RMI National Register. Building 5064 is among those considered potentially eligible for inclusion on the RMI National Register, however, no modifications to this building are proposed and use of the building would not destroy or alter its historically significant elements. (SSDC, 1994a) The proposed launch pad infrastructure modifications would not be expected to have an adverse effect on any potentially eligible historic properties.

Overall, no adverse impacts on cultural resources are anticipated. Should cultural resources be found during the course of site preparation and construction activity, all activities would cease in the area and the proper authorities would be notified.

Launch. Potentially adverse effects on cultural resources located on Meck Island could occur as a result of debris generated by a launch mishap striking Cold War-era facilities which are potentially eligible for inclusion on the RMI National Register of Historic Places. Impacts from debris from a launch mishap would be highly unlikely and would be expected to be not significant. Potentially adverse effects on historic and prehistoric cultural resources in the vicinity could also occur as a result of collection of artifacts by flight preparation personnel during outdoor recreation activities. Impacts on cultural resources are expected to be not significant as a result of additional personnel required to be present in the ROI during construction and launch activities.

All personnel would receive a brief orientation concerning the Archaeological Resources Protection Act and be advised against illegal collection of cultural materials and of the penalties for such collection imposed by the Act. (SMDC, 2001) Because of these and other site-specific measures, impacts on cultural resources from launches at Meck Island would not be significant.

Post-launch. Because of the limited activities associated with post-launch operations, no additional ground disturbance or facility modification would occur. However, because personnel would be on site during cleanup and site maintenance, the potential for unauthorized artifact collection still exists. Again, personnel would be reminded of the sensitivity of cultural resources and the issues of inadvertently damaging or destroying such resources. Thus, no impacts on archaeological sites or historic buildings are expected to occur.

4.6.1.5 Geology and Soils

Pre-launch. There are no unique geologic features on Meck or Kwajalein Islands within USAKA/RTS. Both islands have been extensively dredged and filled over the past several decades, and therefore the existing geologic and soil structure is no longer native. Site preparation and construction activities would not alter the existing geologic or soil structures.

Launch. No impacts on geology and soils would be expected from launches of FTF targets from Meck Island. Meck Island has been extensively disturbed and no additional impacts on the soil would be expected from solid propellant FTF targets.

Post-launch. No impacts on geology and soils would be expected from debris falling into the ocean due to the depth of the ocean where debris would impact. Inert pieces of debris would be deposited in the ocean and would consist of aluminum, steel, graphite composite, plastic, ceramic, and rubber. These materials would likely sink to the ocean floor; however, they would be unlikely to impact geology and soils in ocean areas.

4.6.1.6 Hazardous Materials and Waste Management

Pre-Launch. Management of hazardous materials and waste used in and generated from pre-launch pad setup activities for solid propellant targets are described and analyzed in general in the BMDS PEIS. (MDA, 2007a) Potential impacts from hazardous materials would involve their transportation, storage, and use. Potential impacts from hazardous waste would be related to the generation, accumulation, transportation, and disposal of hazardous wastes used or created in FTF Program activities.

The handling and use of hazardous and toxic materials at the launch site during and between launch operations would be limited and would not result in a significant impact. An activity-specific Hazardous Materials Procedure would be submitted to the USAKA Commander for all imports of hazardous materials within 15 days of receipt of the material, or before use; whichever occurs first. Potentially hazardous materials used for maintenance, grounds keeping, and housekeeping activities would normally consist of fuel (external to those preloaded into the missiles) required for emergency power and heat, various solvents and cleaners, paints and primers, adhesives, and lubricants. Some of the hazardous materials (external to those preloaded into the missiles) that may typically be used as part of missile pad setup activities include coatings, cleaners, solvents, lubricants, and motor and diesel fuel. Most of these materials would be consumed during use, generating minimal waste. If used at a particular facility, fuel for any emergency generators would be stored in dedicated ASTs with secondary containment to minimize potential impacts from spills or leaks. The ASTs would be routinely inspected. In the unlikely event that a spill or release occurs, the use of procedures outlined in the Kwajalein Environmental Emergency Plan and hazardous materials emergency response plan would ensure that the potential impact would be minimal.

Launch. At USAKA/RTS, use and management of hazardous materials associated with missile launch activities would continue to be performed in accordance with the requirements of the UES and the RTS Range Safety office. An activity- specific Hazardous Materials Procedure would be submitted to the USAKA Commander for all imports of hazardous materials within 15 days of receipt of the material, or before use; whichever occurs first. Hazardous waste management at USAKA is performed in accordance with the UES, which permits elementary treatment of hazardous waste discharge prior to entering the Waste Water Treatment Plant. Otherwise, the UES requires shipment of hazardous waste back to the Continental U.S. for treatment and/or disposal. In most cases, contractors use USAKA Prime Contractor Services for waste packaging, manifesting, shipment, and disposal. If contractors make their own hazardous waste arrangements, shipments have to be arranged through USAKA Shipping and

Receiving. Per UES regulations, hazardous waste would be accumulated and stored for less than 90 days.

At USAKA/RTS, if an in-flight malfunction occurs, the Range Safety Officer may initiate flight termination, resulting in debris being deposited beneath the flight path. Debris impacts may occur in the Mid-Atoll Corridor within the Kwajalein Atoll Lagoon. The potential effects on the ocean environment from hazardous materials associated with missile debris have been analyzed in previous NEPA documents, such as the Final STARS EIS (SSDC, 1992), with the conclusion that impacts would be minimal. The effects of hazardous material associated with the proposed action on the ocean environment would be similar to or less than those described in the Final STARS EIS.

Post-launch. Post-launch refurbishment and blast residue removal are all routine post-launch activities. During this process, all hazardous materials and associated wastes would be responsibly managed in accordance with the well-established policies and procedures identified in Section 3. All hazardous and non-hazardous wastes, including industrial wastewater from launch pad catchments, would be properly disposed of, in accordance with applicable UES regulations. Hazardous material and waste-handling capacities would not be exceeded, and management programs would not have to change. As a result, no adverse impacts from the management of hazardous materials and waste are expected.

The impacts of post-launch activities resulting from boosters hitting the ocean have been analyzed in the BMDS PEIS. Accordingly, no significant impacts on the ocean environment would be expected from post-launch activities involving liquid propellant missile. During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In freshwater at 20^{o}C (68^{o}F), it is likely to take over a year for the perchlorate contained in solid propellant to leach out into the water. Lower water temperatures and more saline waters would likely slow the leaching of perchlorate from the solid propellant into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations. (MDA, 2007a) Therefore, post-launch impacts related to hazardous materials and waste are not anticipated to be significant.

4.6.1.7 Health and Safety

Pre-launch. The SR19, Castor IVB, SR19/SR19, LV-2 and LV-3 targets would use a single liquid propellant (hydrazine), and onsite loading into the ACM ACS would be required. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area.

Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any spills/leads would be handled by procedures identified in the Kwajalein Environmental Emergency Plan. The low likelihood of a spill or leak and the implementation of the Kwajalein Environmental Emergency Plan would limit the impact of such a release. No impact on the general public would be expected.

Launch. At Meck Island, distance requirements cannot be met by separation because of the small size of the island and therefore, other methods of personnel protection would be implemented. The Meck Control Building and the Systems Technology Testing Facility are hardened and provide protection to workers from fragments. Therefore, no significant impacts on health and safety would be expected from the launch of FTF targets.

Post-launch. Post-launch refurbishment and blast residue removal are routine operations at a launch site. All applicable UES regulations, would be followed, as well as all appropriate DoD regulations. By adhering to the established safety standards and procedures identified in Section 3, the level of risk to military personnel, contractors, and the general public would be minimal. Consequently, no significant impacts on health and safety are expected.

There is the potential for impact of debris from FTF boosters at any point along the flight corridor due to missile malfunction and/or termination of a missile flight by the FTS. The resulting debris would follow a ballistic trajectory and would impact in designated impact areas in the ocean. Because an exact point of termination cannot be determined, the potential effects footprint is determined by considering the limits of debris fallout based on destruction of a target at the boundaries of the acceptable flight corridor, along with additional flight time based on the time required to initiate the FTS. (MDA, 2007a) The possibility of debris hitting the ground or water outside the designated impact area would be remote; therefore, safety impacts of flight termination would not be significant. Debris modeling and analysis would be conducted for specific proposed activities as appropriate.

4.6.1.8 Land Use

Pre-launch. Potential impacts on land use from site preparation and construction would be related to new construction activities and any restricted access to land associated with the new facilities and infrastructure.

The proposed site preparation and construction at Meck Island would occur in previously disturbed areas. All of the proposed construction would take place on property owned or designated for use by the range/launch facility and would not cause any change in any use of land outside of the property boundaries. No public access to parks, popular visitor destination points, or recreation areas, including water-oriented recreational activities would be restricted due to the proposed construction.

The immediate vicinity of the construction zone would be temporarily affected by limiting access to only necessary personnel. Nevertheless, such activity would be of short duration and considered normal range/launch facility activity that is consistent with the sites's general land use. The proposed site preparation and construction activities are entirely consistent with USAKA/RTS' mission and would occur in accordance with existing land use plans, agreements, policies, and controls, resulting in no significant impacts.

Launch. The launch of solid propellant targets from Meck Island has occurred for many years; therefore, no changes to land use patterns would occur under the proposed action.

Post-launch. No impacts on land use at USAKA/RTS from post-launch activities are anticipated under the proposed action.

4.6.1.9 Noise

Pre-launch. Noise impacts from proposed truck, air, and barge transportation activities could result from added flights, ground vehicle trips, and barge trips required from the receiving airport on Kwajalein Island to the launch location on Meck Island and back. Up to one additional launch per year could occur at USAKA/RTS under the proposed action. This launch would add a maximum of up to seven additional roundtrip C-17 flights and one additional roundtrip C-5 flight into and out of Kwajalein airport at USAKA/RTS. Assuming that the launch also requires up to 12 ground vehicles (including the CT and CE) to transport and provide security for the target and all support equipment, the proposed action would result in a maximum of up to 12 additional ground vehicle trips and several additional barge trips for each launch.

USAKA/RTS has been launching rockets with additional vehicle, air, and barge transportation demands from each of those launches for many years. Because the proposed number of flights, vehicle, and barge trips would not significantly increase current operating rates on Kwajalein Island at USAKA/RTS, noise impacts from these additional flights, vehicle, and barge trips would be not significant.

The proposed site preparation and construction activities on Meck Island at USAKA/RTS are minor and would not occur in areas that are currently pristine and noiseless. Construction at these locations would be temporary in nature and similar to any commercial construction site. Noise generated during construction should have minimal impact to offsite areas. As discussed in the socioeconomics and environmental justice section, there are no sensitive receptors on or around Meck Island. Impacts to wildlife due to noise are discussed in the biological resources section above.

Noise from site preparation and construction activities would comply with applicable DoD Health and Safety regulations and guidelines, Range Safety Requirements, and other recognized standards for operations that involve construction or facility modifications. Because of its military use status, there is no public access to Meck Island. Contractors would prepare and submit to USAKA/RTS a health and safety plan requiring the use of hearing protection, when appropriate, to ensure the health and safety of onsite workers.

Because USAKA/RTS would follow these and other site-specific SOPs to mitigate any impacts due to noise from site preparation and construction activities, impacts from noise are anticipated to be not significant.

Launch. The islands of USAKA/RTS, including Meck Island, have been used for launches of rockets for many years. One additional launch from Meck Island due to the FTF Program would not add any new types or levels of noise to Meck or the surrounding islands. Noise levels produced from the launch of FTF targets would be similar to past and current noise levels, and would be infrequent and short in duration. As discussed in the health and safety section, on-site personnel on Meck and surrounding islands during launches would be provided with proper hearing protection, and therefore noise exposures would not exceed DoD or local short-term noise exposure levels. There is no public access to Meck or any of the surrounding islands, and there are no sensitive receptors on or around the island.

The Final Supplemental EIS on Proposed Actions at U.S. Army Kwajalein Atoll (SSDC, 1993) quantitatively analyzed noise impacts from launches of similar rocket motors assuming up to five launches per year from Meck Island and found those levels to be not significant. Because the FTF Program would only add one additional launch from Meck per year, impacts from noise would be even less than those analyzed in the Supplemental EIS, and therefore would also be not significant.

Also of concern are sonic booms that would occur with each launch after the rocket exceeds the speed of sound. However, any sonic boom would be directed toward the front of the vehicle downrange of USAKA/RTS over the Pacific Ocean. Given the infrequency of the launches (no more than one per year under the proposed action), the short duration of the launch, and similarity to previous launches, no significant impacts from launch activities are expected.

Post-launch. Because of the limited activities associated with post-launch operations, limited amounts of noise would be generated. Thus, no impacts to ambient noise levels are expected.

4.6.1.10 Socioeconomics and Environmental Justice

Pre-Launch. Potential socioeconomic impacts could occur as the result of the influx of temporary construction personnel to the site. The population at USAKA/RTS consists exclusively of site employees, support contractors, and their families. No indigenous Marshallese or children's populations live at USAKA/RTS that would be impacted by the proposed site preparation and construction activities.

Approximately 50 construction personnel would be required at Meck Island during the course of the proposed infrastructure modifications. The housing needs of the additional personnel during site preparation and construction would be met via existing government transient/visitor housing on Kwajalein and Roi-Namur Islands and would not result in a significant socioeconomic impact. The additional construction personnel, by spending money in the local economy via procurement of goods and services, would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local community. The overall impact would be slight and would not cause any population growth. The proposed site preparation and construction activities would not cause displacement or other significant impacts to populations, residences, or local businesses within USAKA/RTS or within the Republic of the Marshall Islands. Overall, no significant socioeconomic, environmental justice, or children's health impacts would occur from the proposed site preparation and construction activities.

Launch. Flight testing activities would require up to 50 temporary duty personnel per launch event. These personnel would be housed in transient/visitor housing on Kwajalein and Roi-Namur Islands which can accommodate the limited and temporary increase in transient personnel. Therefore, no impact to housing and thus to socioeconomic resources would be anticipated from flight test activities. No impacts on indigenous, minority, low-income, or children's populations are anticipated.

Post–Launch. No socioeconomic or environmental justice impacts would be anticipated from post-launch activities.

4.6.1.11 Transportation and Infrastructure

Pre-launch. Transportation of the FTF components and support equipment would be accomplished by aircraft to the USAKA/RTS airport on Kwajalein Island, over roads by trucks to the docks, over sea by barge across the lagoon, then over road by trucks to Launch Hill on Meck Island. These modes of missile transport are routine and the use of harbors and helipads and the land transportation systems on Kwajalein and Meck islands would also be considered normal usage and therefore would not significantly impact transportation to, from, or on the islands.

Potential impacts to airspace from this mode of transportation are discussed in Section 4.4.1.1 and would not affect air transportation into or out of any of USAKA/RTS. Transportation procedures would comply with UES Part 3.6.2, and applicable DoD regulations. All missile components would be packaged in appropriately designed containers, labeled, and handled in accordance with applicable DOT regulations as required in the UES for the transport of hazardous materials. Trained personnel using only appropriately certified cranes and other materiel-handling equipment would handle missile components and handling equipment in accordance with approved SOPs. These procedures would minimize the potential for accidents, as well as provide the means of mitigating potential adverse effects should an accident occur.

Any necessary disruption to ground traffic due to military convoys or road blocks would be temporary and infrequent. Up to one FTF mission per year would be expected at USAKA/RTS. The addition of up to 12 vehicle trips over road and barge would not have any substantial impact on existing transportation patterns or volume on the islands. Any disruption would be of short duration and would not be expected to have a significant impact on transportation.

For the proposed site preparation and construction activities, the construction equipment, materials, and personnel would be brought to USAKA by air, then over road and barge over sea to Meck Island. The use of harbors and helipads and the land transportation systems on Meck and Kwajalein islands would be considered normal usage, and therefore would not represent a significant impact on USAKA/RTS's transportation system.

Launch. Impacts to transportation at USAKA/RTS due to launches of FTF targets could occur as a result of temporarily stopping ground, air, and marine traffic during the launches. Ground, air, and marine transportation have been interrupted at USAKA/RTS in conjunction with other DoD programs in the past, and therefore the proposed FTF launch activities would be considered normal usage. Once an FTF launch is scheduled, there would be a standard sequence of notification and coordination procedures between USAKA/RTS's Range Safety Office and the agencies (FAA, U.S. Coast Guard, local agencies) that would enforce the clearance of land, air, and sea areas. Clearances would be of a short duration, and effects would be negligible.

NOTMARs would be issued when a launch has the potential to impact marine areas and would allow marine vessels to clear the affected area; thus launch activities would have no impact on marine transportation. NOTAMs would be issued prior to launch events that would notify pilots of proposed airspace closures. Impacts on air transportation are discussed above in Airspace. Because of the limited road transportation and military nature of Kwajalein and Meck Islands at USAKA/RTS, road closures would not have a significant impact on transportation. No adverse impacts on transportation would be expected from FTF Program activities.

Post-launch. Debris from boosters may fall into waters normally occupied by commercial shipping. The majority of international trade uses routes of least distance. The actual debris impact area for boosters would be small and would depend upon the individual flight path. Prior warning of proposed launch activities through issuances of NOTMARs would enable commercial shipping to follow alternative routes away from the proposed debris impact area.

4.6.1.12 Visual Resources

Pre-Launch. Potential impacts on visual resources from site preparation and construction activities could occur as a result of the installation of a lightning protection system and minor infrastructure modifications. Construction would occur only in the daytime, which precludes any impacts to visual resources due to nighttime lighting.

The proposed construction would place additional man-made structures within an area already designated and developed as a military launch facility. Although certain areas of USAKA/RTS may be considered regionally scenic, the natural visual landscape of the area has already been altered by the existing buildings and launch infrastructure. Sensitive viewers are not likely to be in the area given that Meck Island is an active military base with restricted public access. Visual resource impacts are not expected to be significant due to the placement of new infrastructure in a previously altered visual landscape adjacent to existing launch facilities.

Launch. Meck Island is an active military base and launches of targets are routine activities. Therefore, the launch of one additional target per year would not cause a significant impact on the area's visual resources.

Post-launch. Post-launch activities associated with the proposed action at Meck Island would have no impacts on visual resources.

4.6.1.13 Water Resources

Pre-Launch. Proposed site preparation and construction activities on Meck Island at USAKA/RTS have the potential to affect water resources on and around the island. Pre-launch construction activities on Meck Island would disturb approximately 0.03 hectare (0.08 acre) of soil and cause short-term adverse marine water quality impacts. Meck Island is a coral atoll that does not contain natural surface water, ground water, or wetland resources. (SSDC, 1997) However, marine water quality could be degraded due to increased sedimentation and turbidity associated with construction activities as well as impacts from accidental spills of the materials used during construction procedures or by construction vehicles, including fuel, cement, paint, anti-freeze, oil, etc.

Modification of the existing lightning protection system and modification of the existing concrete to install a cable tray and metal tie downs to support the CE would not result in significant impacts to water quality because these activities would occur within the footprint of the launch pad, requiring little to no additional ground disturbance.

Best management practices and other SOPs would be used during site preparation and construction activities to prevent or minimize erosion, storm water runoff, and other types of impacts that could adversely impact marine water quality. SOPs at USAKA for construction sites include, but are not limited to, use of detention basins, revegetation of graded areas with native plants, and installation of straw bales and silt fences to minimize storm water runoff to the lagoon or ocean waters. The water quality of construction site runoff can be maintained by prompt cleanup of petroleum products from fuel spills; oils and greases used on equipment; and proper disposal of paints, solvents, and other hazardous materials used during construction in accordance with the UES and other SOPs. (SSDC, 1993) Applicable permits would be obtained and spill response protocols would be developed before commencing construction.

Conformance with the UES, USAKA/RTS SOPs and other best management practices for construction would be expected to minimize the magnitude of adverse marine water quality impacts. Only minor erosion and turbidity impacts and insignificant and accidental spillage of petroleum products and other construction-related materials could occur. Precautions would be taken to ensure Class A water is kept free of trash, solid materials, and oil. Therefore, impacts on water quality from site preparation and construction activities would be expected to be not significant.

Launch. The limited quantities of any hazardous waste that could be produced by launch activities would consist mostly of used or excess solvents and cleaners and would not represent a substantial increase in the quantities of hazardous waste currently generated. Existing spill prevention procedures would be implemented to decrease the risk of accidental release of potentially hazardous substances to water resources and containment berms would be placed around storage areas.

Debris from on-pad failure or explosion could adversely impact marine water resources surrounding Meck Island. However, implementation of launch SOPs would reduce the potential for on-pad failure or explosion and thus the potential risk of impact on water resources. Therefore, impacts on water resources at USAKA/RTS from the FTF Program would be expected to be not significant.

Post-launch. As described in the USAKA Temporary ETR EA, there would be no impacts on water resources expected from post-launch activities at Meck Island (SSDC, 1995a). This analysis remains valid for the FTF Program; therefore no impacts on water resources from post-launch activities would be expected.

4.6.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms, The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Because USAKA/RTS is a location proposed to support the land launch of FTF targets and would not serve as a staging location for air-based launches, potential environmental impacts on all resource areas from the launch of FTF targets from USAKA/RTS would be the same under alternative 1 as under the proposed action.

4.6.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. No construction or site-preparation activities would occur in support of the proposed action at USAKA/RTS. Pre-launch, launch, and post-launch activities involving SR19/SR73, LV-2, or LV-3 would not occur from USAKA/RTS as proposed. MDA would continue to launch target configurations from USAKA/RTS analyzed in existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at USAKA/RTS from the proposed action and existing planned launch activities would continue to occur.

4.7 Wake Island

As described in Section 2.7.5.1., pre-launch preparation and construction activities include moving launch pad #2 from the center to the back end of the concrete apron. Additionally, the power and backup generators, lighting protection system, and tie down locations would need to be moved to the far end of the concrete apron. Section 2.7.2.1 describes pre-launch activities for land launch (i.e., site preparation and construction); land launch activities are detailed in Section 2.7.3.1 and include launch and flight of the target. Post-launch activities are described in Section 2.7.4.1 and include clearing debris from the launch area, refurbishment of launch pad, and possible recovery of target components.

Many of the pre-launch, launch, and post-launch activities described in these sections are routine actions at Wake Island that have been previously analyzed and found to have no significant impact. Sea transportation would not occur at Wake Island and therefore would have no impact. Pre-launch site preparation and construction activities would have no impact on airspace or hazardous materials and waste management at Wake Island. Pre-launch pad setup activities could impact hazardous waste and health and safety at Wake Island and are analyzed in this EA; however, there would be no impacts on any other resource areas from these activities.

The launch of liquid and solid propellant targets has been previously analyzed in the BMDS PEIS. (MDA, 2007a) The site-specific analyses and impacts described in this EA tier from those general analyses in the BMDS PEIS. Additionally, site specific impacts of liquid and solid propellant target launch have been previously analyzed in the following documents: Wake Island EA (SSDC, 1994b); the Wake Island Supplemental EA (MDA 2006b); the WILC Supplemental EA (SMDC,1999); and the THAAD Pacific Test Flights EA (MDA, 2002c). The findings of these documents are summarized below and any impacts specific to the FTF Program are discussed in the appropriate sections..

4.7.1 Proposed Action

4.7.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to Wake Island could occur from truck and air transportation of the target to the launch location.

As described in Section 2.6, a maximum of two roundtrip target shipments per year to and from Wake Island would occur under the proposed action. Two roundtrip shipments would increase the number of landings and takeoffs at Wake's on-site airport by up to a maximum of 32 flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that two FTF launches would occur at Wake Island each year, the maximum annual emissions at the on-site airport due to aircraft transport would be 0.17 metric tons (0.19 tons) of HC; 0.69 metric tons (0.76 tons) of CO; 0.88 metric tons (0.97 tons) of NO_X; and 0.032 metric tons (0.035 tons) of SO_2. Although there has been no ambient air quality monitoring at Wake Island, there are no evident air pollution problems on the island because the strong trade winds quickly disperse any local emissions, and there are no other islands close enough to impact Wake's air quality. The total emissions from air transport shipments of FTF targets to and from Wake's on-site airport would be below any Federal *de minimis* quantities; therefore, the emissions from the additional flights to and from Wake Island would not cause a significant impact on air quality.

Once at Wake, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel less than 5 kilometers (3 miles) one way over local roads to the Wake Island launch site. Exhibit 4-15 presents the estimated emissions per mile for each truck.

Exhibit 4-15. Ground Transportation Emissions Wake Island

Pollutant	Emissions in Grams per Mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year, metric tons (tons)
VOC	1.100	0.000007 (0.000008)	0.00017 (0.00019)
CO	6.461	0.00004 (0.00004)	0.001 (0.001)
NO_X	15.434	0.00009 (0.0001))	0.002 (0.002)
PM_{10}	0.316	0.000002 (0.000002)	0.00005 (0.00006)
SO_2	0.346	0.000002 (0.000002))	0.00005 (0.00006)

[1] The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips are assumed to be six miles.

The increased emissions from an additional 12 trucks up to two times per year traveling a maximum of 10 kilometers (6 miles) would be very small as indicated in Exhibit 4-15. The estimated emissions from trucks transporting the FTF target and its support equipment from Wake's airport to the launch location would be significantly below the Federal *de minimis* levels for all pollutants. Therefore, air quality impacts from emissions from ground transportation vehicles at Wake Island associated with the transport of the FTF targets would be not significant.

Pre-Launch. Impacts on air quality from pre-launch activities at Wake Island could occur from physical site preparation and construction activities and pad setup activities preparing the targets for launch. All site preparation and construction activities proposed for Wake Island would be on impervious concrete; therefore, no ground disturbing activities would occur under the proposed action. However, construction equipment and vehicles would still be used to prepare the launch site for FTF launches; therefore potential impacts include exhaust emissions (e.g., CO, NO_X, VOCs, PM_{10}, and SO_X) from construction equipment and related vehicles. Construction is estimated to require approximately 10 months.

The same types of construction equipment and vehicles would be used at Wake Island as were described for Vandenberg AFB in Section 4.4.1.1. For the purposes of analysis, it was conservatively assumed that the construction vehicles would be active 10 hours per day for an estimated 160 days[10] of construction. The daily emissions from typical construction equipment and vehicles of CO, VOCs, NO_X, SO_X, and PM_{10} are presented in Exhibits 4-11 and 4-12. For the 160 days of construction estimated, the total emissions for all construction equipment and vehicles would be 10.2 metric tons (11.2 tons) of CO,

[10] Although total construction time would be expected to take approximately 10 months, only eight months were assumed to require heavy construction equipment. Assuming there are four work-weeks per month, and that each work-week consisted of five days, the total number of construction days would be 160.

1.1 metric tons (1.2 tons) of VOCs, 24.1 metric tons (26.6 tons) of NO_X, 2.3 metric tons (2.5 tons) of SO_X, and 0.75 metric tons (0.83 tons) of PM_{10}. Proper tuning and maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance.

The total emissions from all construction-related vehicles and equipment would be considerably below any Federal *de minimis* levels, and would not be expected to cause exceedances of the NAAQS. Construction would be conducted in accordance with all applicable laws and regulations. While construction would cause a slight increase in some air pollutants, the impact would be both temporary and localized. Once construction ceased, air quality would return to its former level. Therefore the impacts from site preparation and construction activities at Wake Island would be not significant.

For solid propellant boosters, pre-launch activities, such as elevating the booster to the launch level, would not significantly impact air quality.

Launch. The primary exhaust products of solid propellant boosters are HCl, CO, NO_X, and Al_2O_3. HCl and CO emissions are gases and Al_2O_3 is emitted as particulate. CO and NO_X emissions are further oxidized to CO_2 and NO_2 due to the high temperatures experienced during launch; however, the quantities released from a single target launch are not expected to contribute to localized accumulation of greenhouse gases. Gaseous HCl produced by launches of solid propellant boosters combines with water in the atmosphere to create hydrochloric acid aerosol, which may contribute to the formation of acid rain. However, this is not a concern at Wake Island because it is not a humid area and because of the steady, high trade winds that would continuously disperse any HCl produced. Exhibit 4-16 details the combustion products identified for the target configurations considered in the Wake Island EA as well as the LV-2 as assessed in the GMD ETR EIS.

Exhibit 4-16. Combustion Products for Castor IVB, Castor IVB/M57A-1, and LV-2 Targets, kilograms (pounds)

Species	Castor IVB[1]	Castor IVB/M57A-1[1]	LV-2[2]
Al_2O_3	3,761 (8,292)	4,294 (9,467)	6,710 (14,793)
CO	2,230 (4,916)	2,650 (5,842)	5,480 (12,081)
HCl	2,062 (4,545)	2,393 (5,276)	390 (860)
N_2	822 (1,811)	957 (2,110)	4,060 (8,951)
H_2O	624 (1,376)	772 (1,702)	720 (1,587)
H_2	235 (519)	274 (604)	NA
CO_2	184 (407)	232 (511)	350 (772)

[1] Source: Wake Island EA (SSDC, 1994b)
[2] Source: GMD ETR EIS (MDA, 2003a)
NA= Not Available

The Wake Island EA analyzed the air quality impacts associated with normal launch of the Castor IVB. Additionally, the EA analyzed a two-stage accident condition for the Castor IVB/M57A-1 configuration. Results from TSCREEN PUFF modeling of Castor IVB launch were clearly below corresponding NAAQS and guideline values. Modeling of the Castor IVB/M57A-1 launch scenario resulted in values well below applicable NAAQS and guideline values with one exception. The Short-term Public Emergency Guidance Level for HCl was exceeded for distances less than 10 kilometers (6.2 miles) for an on-pad catastrophic failure of a Castor IVB/M57A-1 target missile. (SSDC, 1994b)

The TSCREEN PUFF model considered HCl, CO, Al_2O_3 and levels. If the results of the launch scenario CO modeling are doubled to account for the increase in CO from combustion of the LV-2, values remain well below NAAQS. Additionally, doubling Al_2O_3 and HCl values determined for both the launch and failure scenarios provides figures well below emergency exposure guidance levels and threshold limit values. The LV-2 target configuration releases much less HCl than the Castor IVB/M57A-1 target configuration; therefore, the Short-term Public Emergency Guidance Level for HCl would most likely not be exceeded in the event of an on-pad catastrophic failure. Because the LV-2 is the largest target proposed to be launched at Wake Island, no exceedences of NAAQS or guideline values would be expected from the launch solid propellant targets at Wake Island; therefore, no significant impacts to air quality would be anticipated.

The launch of generic liquid propellant target with maximum propellant quantity comprised of approximately 3,400 kilograms (7,500 pounds) of main fuel, 12,000 kilograms (26,500 pounds) of oxidizer and 120 kilograms (270 pounds) of initiator fuel, was analyzed in the Wake Island SEA. (MDA, 2007b) The Wake Island SEA modeled the launch of a generic liquid propellant target using the TSCREEN PUFF Program. The LPT proposed to be launched from Wake Island under the FTF Program has a smaller propellant mass then the generic liquid propellant target modeled. Therefore would be expected to have fewer impacts than those analyzed for the generic liquid propellant target.

Launches of liquid propellant boosters would use triethylamine and dimethylaniline as initiator fuel. The initiator fuel would have emissions similar to those discussed for solid propellant boosters; however, the quantities involved would be significantly smaller. Therefore, emissions from the launch of liquid propellant boosters would have minimal impact on air quality.

The Wake Island SEA concluded that a generic liquid propellant target maximum propellant budget of approximately 3,400 kilograms (7,500 pounds) kerosene-based fuel, 12,000 kilograms (26,450 pounds) IRFNA, and 120 kilograms (270 pounds) initiator fuel would result in expected CO emissions of about 4,000 kilograms (8,800 pounds). The estimated maximum atmospheric CO concentration for a 4,000-kilogram release would be 4.81 mg/m^3 approximately 3.0 kilometers (1.9 miles) from the point of release, which is well below the one-hour and eight-hour NAAQS. A 4,000-kilogram release was chosen to provide a safety margin for not exceeding the NAAQS standards by 50 percent. Significant impacts on air quality would not be expected to result from a generic liquid propellant target launch. Therefore, significant impacts on air quality would not be expected to result from an FTF LPT launch.

Post-Launch. Any post-launch refurbishment activities would meet all applicable rules for VOCs. No air emission permits are required for these operations. With the exception of some minor, localized increases in particulate matter from the occasional brushing of blast residues from the launch tube walls, if necessary, and launch stools, no adverse effects on air quality are expected.

The impacts on air quality from post-launch activities resulting in boosters hitting the ocean have been analyzed in the BMDS PEIS. Impacts would be similar to, but less than those impacts for boosters hitting land because the residual liquid propellants would be released into the ocean rather than the air. Solid propellant, if still in the casing, might continue to burn for some time even under water, possibly impacting air quality. (MDA, 2007a) Because FTF targets would also impact the BOA, impacts would be similar to those discussed in the BMDS PEIS, and minimal impacts on air quality would be expected.

4.7.1.2 Airspace

Pre-Launch. Impacts on airspace from pre-launch activities at Wake Island could occur from air transportation of the targets to the launch location.

Previous analyses have determined that an increase in air transportation operations could affect the airspace of the location where such activities would occur. These documents concluded that because all operations involving air transportation of targets would be performed in accordance with existing airspace use requirements, impacts on the airspace in all locations would be not significant. Air transportation related to the FTF program at Wake Island would be performed in accordance with both existing airspace use requirements and Wake Island’s standard operating procedures, therefore no significant impacts would be expected.

There would be no impact on airspace from pre-launch site-preparation and construction, preparation of the launch site for arrival of the target, short-term storage of the target (if necessary), and setting the target on the launch stand, because these activities do not physically interfere with navigable airspace or affect airspace scheduling.

Launch. Wake Island is located in international airspace. Therefore, no formal airspace restrictions surround it. The only air traffic control facility available is the control tower.

Missile launches are short-term discrete events and missiles launched with trajectories of 87 degrees elevation would remain clear of the route for the one military aircraft that makes regularly scheduled trips to the island and should pose no impacts. Launch activities would be coordinated with the Central Air Reservation Facility and the Oakland ARTCC Oceanic Control-5 Sector and would be governed by procedures of the ICAO. This coordination would minimize the potential for impacts on regional airspace. NOTAMs would be issued as necessary to provide information to all aircraft transiting the area. (MDA, 2002c) FTF launches would be coordinated with the Central Air Reservation Facility and would comply with the procedures of the ICAO. Consequently, impacts on airspace use would not be considered significant.

Post-Launch. If debris from FTF boosters falls into the ocean, MDA would not recover the debris. Therefore, helicopters and other equipment would not be used, and no impacts on airspace would be expected.

4.7.1.3 Biological Resources

Pre-Launch. Proposed site preparation and construction activities would result in little to no impact on biological resources because they would occur within the footprint of existing infrastructure, requiring little to no additional ground disturbance. The combination of increased noise levels and human activity would likely displace some small mammals and birds that forage, feed, nest, or have dens in proximity to proposed construction areas. However, sufficient foraging and feeding habitat occurs in adjacent areas to accommodate potentially displaced wildlife. Disturbance from equipment noise and temporary increase in personnel would be brief and would not be expected to have a significant adverse effect on resident wildlife species or migratory bird populations.

There would be no impacts to biological resources from pre-launch activities for solid propellant boosters. For non pre-fueled liquid propellant boosters, no more than a few grams of propellant would be released during normal fueling operations and appropriate responses to leaks and releases would be implemented to minimize the hazard to biological resources. All fueling would be conducted using impermeable barriers appropriate for this type of activity, which would minimize the potential for a spill to impact biological resources.

Launch. Because FTF target launches would be relatively infrequent events at Wake Island, disturbance to wildlife would be brief and would not be expected to have a lasting impact nor a measurable negative effect on wildlife. Launch emissions from non-pre-fueled liquid propellant boosters would have the potential to impact biological resources, but the impact would be minimal. Prior studies have shown that low-level short term exposure to HCl or Al_2O_3, as would be the case from solid target launches, would not cause significant damage to vegetation or wildlife. (MDA, 2007a) Consequently, emissions associated with FTF launch would not have a significant adverse affect on vegetation or wildlife.

There would be few, if any, impacts on coral reefs resulting from a nominal launch of an FTF target. The missile would quickly leave the vicinity of Wake Island and continue on a ballistic trajectory until it is intercepted or falls into the BOA.

Previous environmental analysis has determined that the noise from missile launches generally causes no significant impacts on birds or other wildlife. The potential for indirect impacts on birds may result from the presence of people on the island. Human intrusion into seabird colonies can result in abandonment of the colony from repeated or prolonged disturbance. Also, nests exposed when birds are flushed may be susceptible to predation by frigatebirds. Due to the limited number of launches associated with the proposed action, impacts on wildlife from noise levels or human intrusion would not be expected to be significant.

An additional potential impact could arise as a result of contamination in the case of an accidental spill. Generally, hazardous materials contamination would be restricted to small areas near the source of pollution. Local spills of petroleum products such as gasoline, jet fuel, and oil could be harmful if they are allowed to come into contact with or are ingested by birds. Spills into the lagoon may spread over the surface of the waters and result in impacts including death of a small number of seabirds that may drink from or land on the water. However, because of SOPs already in place, adverse impacts would not be likely.

The open ocean area around Wake Island is very large and little is known of the numbers and distribution of marine biological resources, including marine mammals and sea turtles. Of the internationally protected species, sea turtles and marine mammals would have the greatest risk, although extremely remote, of incidental impact from falling missile debris or propellants in the booster drop area or in the event of an aborted flight. The taking of a protected species would be a significant impact, but the probability of such an occurrence would be extremely remote. (MDA, 2007b) Thus, no significant impacts on marine biota would be anticipated from implementing the proposed action. Although federally protected, endangered species and designated critical habitat are known to exist at Wake Island, no significant impacts on such resources would occur from implementation of the proposed action.

Post-Launch. The intermittent movement of trucks and any repair/clean-up/waste handling equipment would not produce substantial levels of noise, and vehicles normally would remain on paved or gravel areas. Thus, the limited actions associated with post-launch operations would have no adverse effects on local vegetation or wildlife, including threatened and endangered species, and critical and other environmentally sensitive habitats.

The biological impacts of post-launch activities resulting in motors and boosters hitting the ocean have been analyzed in the BMDS PEIS. Expended motors and boosters hitting the ocean surface would impart a considerable amount of kinetic energy to the ocean water upon impact. For example, interceptors would hit the water with speeds of 91 to 914 meters (300 to 3,000 feet) per second. The shock wave from their impact with the water would be similar to that produced by explosives. Depending on the water depth, strong waves from the impact may detach kelp strands from the sea floor. During successful missions, boosters would impact in deep open ocean waters. At close ranges, injuries to marine mammal internal organs and tissues would likely result. However, the density of marine species including marine mammals generally decreases, and the corresponding probability of impact decreases, as the distance from the shore increases. Injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 (6 in 10,000) marine mammals exposed per year). (MDA, 2007a) Due to the infrequency of proposed FTF launches, and the low probability of marine mammal injury, the proposed action would not be expected to adversely impact marine mammals.

Impacts to marine biological resources from releases of residual propellants from liquid propellant boosters would not be significant. The natural buffering capacity of sea water and the strong ocean currents would neutralize the reaction to any release of liquid propellants associated with FTF targets.

The parts of solid rocket motor propellant expelled from a destroyed or exploded rocket motor that fall into the ocean would most likely sink to the ocean floor at depths of thousands of meters. At such depths, the propellant parts would be located away from feeding marine mammals. (MDA, 2007a) Therefore, marine animals would not be impacted from ingesting the solid propellant associated with FTF targets.

4.7.1.4 Cultural Resources

Pre-Launch. Cultural resource surveys of Wake Island have not identified any unique paleontological, archaeological, or traditional use resources. (MDA, 2002c) Therefore, the proposed infrastructure modifications for the proposed action would not impact these resources.

Wake Island was designated a National Historic Landmark in 1985 to preserve both the battlefield where important World War II events occurred and Japanese and American structures from that period. However, many of these features are no longer visible as a result of natural weathering/decomposition and extensive post-World War II construction on the island in support of missile testing and research. Historic and cultural resources could potentially exist below the ground surface; however, the proposed action involves no new major construction or ground disturbance, would not impact the sub-surface resources or other historic properties, and thus would not alter the historic character of the site.

Overall, no adverse impacts on cultural resources are anticipated. Should cultural resources be found during the course of site preparation and construction activity, all activities would cease in the area and the proper authorities would be notified.

Launch. FTF target launches are expected to have no substantial impact on the island's cultural resources. While incidental collection of cultural resources could affect cultural resources on the island, personnel would be briefed on the penalties that could be incurred if sites are damaged or destroyed; therefore, no impacts from proposed activities are anticipated.

The possibility of damage to an existing historical structure from falling debris or from a target launch abort or launch mishap would be remote because such an event would be extremely unlikely. Therefore, significant impacts on cultural resources would not be expected.

Post-Launch. Because of the limited activities associated with post-launch operations, no additional ground disturbance or facility modification would occur. However, because personnel would be on site during cleanup and site maintenance, the potential for unauthorized artifact collection would still exist. Personnel would be reminded of the sensitivity of cultural resources and the issues of inadvertently damaging or destroying such resources. Thus, no impacts on archaeological sites or historic buildings would be expected to occur.

4.7.1.5 Geology and Soils

Pre-launch. Impacts on geology and soils from pre-launch activities at Wake Island could occur from physical site preparation and construction activities. Potential impacts on geology and soils would consist of soil and ground disturbing activities and the potential for leaks and spills associated with the proposed action.

There are no geologic features present at Wake Island that would be impacted by site preparation and construction activities under the proposed action. Information bearing on seismic design and construction standards and surface faulting potential would be considered by the design engineer in making final siting and design determinations, which would minimize potential impacts.

Proposed infrastructure modifications (i.e., installation of lightning protection systems and metal tie downs) would require little to no ground disturbance and would have a localized, minimal impact on soils. New concrete surfaces would increase the amount of impervious surfaces at launch locations, but would not result in significant impacts on soils because the surfaces would be located in previously disturbed areas immediately adjacent to existing infrastructure.

There is potential for soil contamination from spills or leaks from construction equipment, but any impacts would be temporary and localized. Large spills or leaks would be handled according to standard spill response protocol, which includes delineating the extent of the contamination and removing it. Therefore, any potential soil contamination impacts would be contained and would be not significant.

Launch. No impacts on geology and soils would be expected from launches of FTF targets from Wake Island. Wake Island has been previously disturbed and no additional impacts to the soil would be expected from launch of liquid or solid propellant FTF targets.

Post-launch. No impacts on geology and soils would be expected from debris falling into the ocean due to the depth of the ocean where debris would impact. Inert pieces of debris would be deposited in the ocean and would consist of aluminum, steel, graphite composite, plastic, ceramic, and rubber. These materials would likely sink to the ocean floor; however, they would be unlikely to impact geology and soils in ocean areas.

4.7.1.6 Hazardous Materials and Waste

Pre-launch. Management of hazardous materials and waste used in and generated from pre-launch pad setup activities for solid propellant targets are described and analyzed in general in the BMDS PEIS. (MDA, 2007a) Potential impacts from hazardous materials would involve their transportation, storage, and use. Potential impacts from hazardous waste would be related to the generation, accumulation, transportation, and disposal of hazardous wastes used or created during FTF Program activities.

The handling and use of hazardous and toxic materials at the launch site during and between launch operations would be limited and would not result in a significant impact. Potentially hazardous materials used for maintenance, grounds keeping, and housekeeping activities would normally consist of diesel required for emergency power and heat, various solvents and cleaners, paints and primers, adhesives, and lubricants. Some of the hazardous materials that may typically be used as part of missile pad setup activities include coatings, cleaners, solvents, lubricants, and motor and diesel. Most of these materials would be consumed during use, generating minimal waste. If used at a particular facility, diesel for emergency generators would be stored in dedicated ASTs with secondary containment to minimize potential impacts from spills or leaks. The ASTs would be routinely inspected. In the unlikely event that a spill or release occurs, the use of procedures outlined in the site's SPCC plan and hazardous materials emergency response plan would ensure that the potential impact would be minimal.

Launch. Launch activities would produce small quantities of hazardous wastes such as used or excess solvents and cleaners. These hazardous wastes would be similar to wastes already generated and handled at Wake Island and they would be managed in accordance with applicable regulatory requirements. The small quantities of hazardous waste expected to be generated would not represent a significant increase in the amount of hazardous waste currently generated. No significant impacts from hazardous materials or wastes would be expected.

Post-launch. Post-launch refurbishment and blast residue removal are all routine post-launch activities. During this process, all hazardous materials and associated wastes would be responsibly managed in accordance with the well-established policies and procedures. All hazardous and non-hazardous wastes, including industrial wastewater from launch pad catchments, would be properly disposed of, in accordance with applicable Federal, state, local, DoD regulations. Hazardous material and waste-handling capacities would not be exceeded, and management programs would not have to change. As a result, no adverse impacts from the management of hazardous materials and waste would be expected.

The impacts of post-launch activities resulting from boosters hitting the ocean have been analyzed in the BMDS PEIS. Accordingly, no significant impacts to the ocean environment would be expected from post-launch activities involving liquid propellant missile. During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In freshwater at 20^{o}C (68^{o}F), it is likely to take over a year for the perchlorate contained in solid propellant to leach out into the water. Lower water temperatures and more saline waters would likely slow the leaching of perchlorate from the solid propellant into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations. (MDA, 2007a) Therefore, post-launch impacts related to hazardous materials and waste are not anticipated to be significant.

4.7.1.7 Health and Safety

Pre-launch. The SR19, Castor IVB, SR19/SR19, and LV-2 targets would use hydrazine and onsite loading into the ACM ACS would be required. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area. Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any small leaks/spills would be contained in a drip pan partially filled with water. Water would be added to larger leaks/spills to dilute the hydrazine and moist absorbent pads/booms would be used to contain and isolate the release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release. No impact on the general public would be expected.

Launch. Missile launch operations within the military have been conducted for many years. Safety requirements have been developed based upon the lessons learned during this time. While risks associated with launch activities will always be present, standard safety procedures would reduce the risks to an acceptable level.

Normal target launch operations would not entail any increased hazards at Wake Island, since normal system performance is considered to be a safe operation. IRFNA is a highly toxic, corrosive, and potentially fatal compound, and must be handled with caution. During target propellant loading operations, personnel would be required to wear appropriate protective clothing, such as impervious gloves, safety goggles, full body covering suit with hood, gloves, and boots, and approved self-contained breathing apparatus or must be supplied with external supplied air.

In the event of a launch accident, there is the potential for significant hazards associated with debris impact, explosion, and release of toxic combustion products. An LHA would be established around the launch facility. This area represents the footprint of maximum hazard associated with debris impact and explosive overpressure. Any personnel inside this footprint area would remain within facilities rated to provide adequate blast and debris protection and protection from exposure to any propellants or chemicals that might be spread as a result of a catastrophic missile failure. Therefore, the risk of a significant health and safety impact resulting from such a failure is considered not significant. Therefore, no significant health and safety impacts would be expected from launch activities.

Post-launch. Post-launch refurbishment and blast residue removal are routine operations at Wake Island. All applicable Federal, state, and local health and safety requirements, such as OSHA regulations, would be followed, as well as all appropriate DoD regulations. By adhering to the established safety standards and procedures, the level of risk to military personnel, contractors, and the general public would be minimal. Consequently, no significant impacts on health and safety would be expected.

There is the potential for impact of debris from FTF boosters at any point along the flight corridor due to missile malfunction and/or termination of a missile flight by the FTS. The resulting debris would follow a ballistic trajectory and would impact in designated impact areas in the ocean. Because an exact point of termination cannot be determined, the potential effects footprint would be determined by considering the limits of debris fallout based on destruction of a target at the boundaries of the acceptable flight corridor, along with additional flight time based on the time required to initiate the FTS. (MDA, 2007a) The possibility of debris hitting the ground or water outside the designated impact area would be remote; therefore, safety impacts of flight termination would not be significant. Debris modeling and analysis would be conducted for specific proposed activities as appropriate.

4.7.1.8 Land Use

Pre-launch. The proposed site preparation and construction at Wake Island would occur in previously disturbed areas adjacent to existing military launch facilities. This area does not contain unique or prime farmland protected under the FPPA and would not result in an adverse land use impact. All of the proposed construction would take place on property owned or designated for use by the launch facility and would not cause any change in any use of land outside of the property boundaries. No public access to parks, popular visitor destination points, or recreation areas, including water-oriented recreational activities would be restricted due to the proposed construction.

The immediate vicinity of the construction zone would be temporarily affected by limiting access to only necessary personnel. Nevertheless, such activity would be of short duration and considered normal range/launch facility activity that is consistent with the facility's general land use. The proposed site preparation and construction is entirely consistent with Wake Island's mission and would occur in accordance with any land use plans, agreements, policies, or controls for those locations, resulting in no significant impacts.

Launch. Launch activities associated with the proposed action are consistent with current land use practices, policies and controls for Wake Island. No impacts on current land use patterns would result from the proposed action.

Post-launch. Post-launch activities at Wake Island would have no impact on land use patterns.

4.7.1.9 Noise

Pre-Launch. Up to two additional launches could occur at Wake Island per year under the proposed action. Each of those launches would require up to seven additional roundtrip C-17 flights and one additional roundtrip C-5 flight to and from the Wake Island airfield, totaling 32 additional flights per year. Assuming that each launch also requires up to 12 ground vehicles (including the CT and CE) to transport and provide security for the target and all support equipment, there would be 24 additional ground vehicle trips at each launch location for each launch planned there during the year.

Noise impacts to Wake Island from truck and air transportation activities could result from these added flights and ground vehicle trips required from the receiving air field to the launch location and back.

Wake Island has been launching rockets with additional vehicle and air transportation demands from for many years. Because the proposed number of flights and vehicle trips would not significantly increase current operating rates at Wake Island, noise impacts from these additional flights and vehicle trips would be not significant.

Construction would result in intermittent, short-term noise effects that would be temporary, lasting for the duration of the noise generating construction activities. Noise generating activities would include utility construction. With the high ambient noise levels from wind and surf, however, the additional noise generated by construction activities would be negligible.

Launch. Launches would not add new types or levels of noise to Wake Island. Noise levels produced by the launch of FTF targets would be similar to past and current noise levels. Only two FTF target launches are anticipated per year, and these launches would be short in duration. Personnel engaged in missile launch operations would be inside reinforced concrete shelters. All other island personnel would be evacuated beyond the LHA, where they would not require hearing protection.

Also of concern are sonic booms that would occur with each launch after the rocket exceeds the speed of sound. However, any sonic boom would be directed toward the front of the vehicle downrange of Wake Island over the Pacific Ocean. Noise impacts on biological resources are addressed in Section 4.7.1.3.
Given the infrequency of the launches, the short duration of the launch, and similarity to previous launches, adverse noise impacts on the public from launch activities are not anticipated.

Post-Launch. Because of the limited activities associated with post-launch operations, limited amounts of noise would be generated. Thus, no impacts to ambient noise levels are expected.

4.7.1.10 Socioeconomics and Environmental Justice

Pre-Launch. Given Wake Island's military mission, the only potential socioeconomic impact resulting from the proposed activities would be to housing availability for the influx of temporary construction personnel. Impacts related to demographics, residences, local businesses, employment, and income are not issues because the economy on Wake Island is limited to providing services to transient military personnel and contractors located on the island. No indigenous, minority, low-income, or children's populations live on Wake Island that would be impacted by the proposed site preparation and construction activities.

Approximately 50 construction personnel would be required at Wake Island during the course of the proposed infrastructure modifications. These personnel would be housed in existing barracks, which can accommodate up to 300 people. Therefore, the additional construction personnel required under the proposed action would not affect housing availability and no significant socioeconomic impacts would occur from the proposed site preparation and construction activities.

Launch. Launch activities would require up to 50 temporary duty personnel per launch event. These personnel would be housed in existing barracks, which can more than accommodate the limited and temporary increase in transient personnel. Therefore, no impact on housing and thus on socioeconomic resources would be anticipated from FTF target launch activities.

Post–Launch. No socioeconomic or environmental justice impacts would be anticipated from post-launch activities.

4.7.1.11 Transportation and Infrastructure

Pre-Launch. Construction equipment and materials would be brought to Wake Island by ocean carrier or by plane and transported via road to the launch site. Wake Island's transportation infrastructure would not be overburdened by the site preparation and construction activities or by the transient construction personnel. The number of flights to and from the island from Hickam AFB may need to be increased, but the island has aircraft ramps for processing passengers and cargo and for refueling up to 36 aircraft, therefore, no significant impacts on the air transportation infrastructure would be anticipated.

Road transportation on the island is provided by U.S. Air Force or contractor vehicles, and the island could readily accommodate additional traffic over the two buses that currently transport aircrews and passengers between the Base Operations Building and the Dining Hall/Billeting Office. (SSDC, 1994b) The island is currently supplied by sea-going barges and ships, and no marine transportation impacts would be anticipated as a result of the proposed site preparation and construction activities. Therefore, the impacts on transportation from the FTF Program would not be significant.

Launch. NOTMARs would be issued when a launch has the potential to impact marine areas and would allow marine vessels to clear the affected area; thus launch activities would have no impact on marine transportation. NOTAMs would be issued prior to launch events that would notify pilots of proposed airspace closures. Because of the limited road transportation and military nature of Wake Island, road closures would not have a significant impact on transportation. No adverse impacts on transportation would be expected from FTF target launches.

Post-Launch. Debris from boosters may fall into waters normally occupied by commercial shipping. The majority of international trade uses routes of least distance.

The actual debris impact area for boosters would be small and would depend upon the individual flight path. Prior warning of proposed launch activities through issuances of NOTMARs would enable commercial shipping to follow alternative routes away from the proposed debris impact area; therefore, no post-launch impacts would be expected.

4.7.1.12 Visual Resources

Pre-Launch. Potential impacts to visual resources could occur as a result of minor infrastructure modifications. Construction would occur only during daytime, which would preclude any impacts to visual resources due to nighttime lighting.

The proposed construction would place additional man-made structures within an area already designated and developed as a military launch facility. Although certain areas of Wake Island may be considered regionally scenic, the natural visual landscape of the area has already been altered by the existing buildings and launch infrastructure. Sensitive viewers are not likely to be in the area given that Wake Island is an active military test site with restricted public access. Visual resource impacts are not expected to be significant due to the placement of new infrastructure in a previously altered visual landscape adjacent to existing launch facilities.

Launch. Based on the brevity of launch events and the infrequency of FTF target launches proposed at Wake Island, these events would not significantly impact the visual landscape at Wake Island.

Post-Launch. No visual resource impacts would be anticipated from post-launch activities.

4.7.1.13 Water Resources

Pre-Launch. The proposed site preparation and construction activities would result in little to no impact on water resources because they would occur within the footprint of existing infrastructure, requiring little to no additional ground disturbance. Wake Island does not contain natural surface water or wetland resources, and limited fresh and brackish ground water resources exist on Wake Island. (SSDC, 1994b) These resources would not be encountered or affected by the minor proposed site preparation and construction activities. Applicable permits would be obtained and spill response protocols would be developed before commencing construction.

Best management practices and other SOPs would be used during site preparation and construction activities to minimize any potential erosion or runoff from the limited amount of ground disturbance. Therefore, no significant impacts on water resources would be anticipated.

Launch. The limited quantities of any hazardous waste that could be produced by launch activities would consist mostly of used or excess solvents and cleaners and would not represent a substantial increase in the quantities of hazardous waste currently generated. Large spills or leaks would be handled according to standard spill response protocol, which includes delineating the extent of the contamination and removing it. Existing spill prevention procedures would be implemented to decrease the risk of accidental release of potentially hazardous substances to water resources and containment berms would be placed around storage areas, therefore no significant impacts would be anticipated.

Debris from on-pad failure or explosion could adversely impact water resources. However, implementation of launch SOPs would reduce the potential for on pad failure or explosion and thus the potential risk of impact on water resources.

Post-Launch. No impacts on water resource would be anticipated from post-launch activities.

4.7.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Because Wake Island is a location proposed to support the land launch of FTF targets and would not serve as a staging location for air-based launches, potential environmental impacts on all resource areas from the launch of FTF targets from Wake Island would be the same under alternative 1 as under the proposed action.

4.7.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. No construction or site-preparation activities would occur in support of the proposed action at Wake Island. Pre-launch, launch, and post-launch activities involving SR19/SR73 or LV-2 would not occur from Wake Island as proposed. MDA would continue to launch those target configurations from Wake Island addressed in existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at Wake Island from the proposed action and existing planned launch activities would continue to occur.

4.8 Pacific Missile Range Facility, Hawaii

PMRF would serve as a land launch location and for FTF solid propellant targets. Pre-launch activities at PMRF would include pre-launch storage and pad setup activities. There are no physical site preparation and construction activities anticipated at PMRF.

Launch activities at PMRF would include launch and flight of solid propellant targets. The launching of targets would occur from existing launch sites. Post-launch activities would include refurbishment of the launch pad.

Additionally, PMRF would serve as a staging location for air launch of FTF solid propellant targets. Pre-launch staging operations would be performed at PMRF. Following staging operations, the FTF Target would be loaded into a C-17 aircraft and launched over the BOA. Following target launch, the C-17 would return to the staging location for post-launch cleaning and refurbishment.

Many of the pre-launch, launch, and post-launch activities described in these sections are routine actions at PMRF and have been previously analyzed and shown to have no significant impact. Sea transportation would not occur at PMRF and therefore would have no impact. Liquid propellant targets would not be launched from PMRF. Pre-launch pad setup activities may have the potential to impact hazardous waste and health and safety at PMRF and therefore are analyzed in this EA; however, no impact would be anticipated for any other resource areas for these activities.

The launch of solid propellant targets has been previously analyzed in the BMDS PEIS. (MDA, 2007a) The analyses and impacts described in this EA have been tiered from the BMDS PEIS. Additionally, site specific impacts of the launch of solid propellant targets at PMRF have been analyzed in the PMRF Enhanced Capability EIS (U.S. Department of the Navy, 1998) and the THAAD Pacific Test Flights EA (MDA, 2002c). The findings of these documents are summarized below and any impacts specific to the FTF Program are discussed in the appropriate sections.

4.8.1 Proposed Action

4.8.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to PMRF could occur from truck and air transportation of the target to the launch location.

As described in Section 2.6, a maximum of seven roundtrip target shipments per year to and from PMRF would occur under the proposed action. These shipments would increase the number of landings and takeoffs at PMRF's on-site airport by up to a maximum of 112 flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that seven FTF launches would occur at PMRF each year, the maximum amount of annual emissions at PMRF's airport from aircraft transport would be 0.61

metric tons (0.67 tons) of HC, 2.42 metric tons (2.66 tons) of CO, 3.08 metric tons (3.39 tons) of NO_X, and 0.11 metric tons (0.12 tons) of SO_2. PMRF is considered in attainment for all Federal NAAQS. The total emissions from air transport shipments of FTF targets to and from PMRF's airport would be below any Federal *de minimis* quantities, therefore the emissions from the additional flights to and from the base would not significantly impact air quality.

Once at PMRF, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel 3.2 kilometers (2 miles) one way over local government-controlled roads to the launch site. Exhibit 4-17 presents the estimated emissions per mile for each truck during ground transportation.

Exhibit 4-17. Ground Transportation Emissions PMRF

Pollutant	Emissions in Grams per Mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year, metric tons (tons)
VOC	1.100	0.0000044 (0.0000049)	0.00037 (0.00041)
CO	6.461	0.000026 (0.000029)	0.0022 (0.0024)
NO_X	15.434	0.000062 (0.000068)	0.0052 (0.0057)
PM_{10}	0.316	0.0000013 (0.0000014)	0.00011 (0.00012)
SO_2	0.346	0.0000014 (0.0000015)	0.00012 (0.00013)

1 The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to be four miles.

The increased emissions from an additional 12 trucks seven times per year traveling a maximum of 6.4 kilometers (4 miles) would be extremely small. The estimated emissions from trucks transporting the FTF target and its support equipment from PMRF's airport to the launch location would be significantly below the Federal *de minimis* levels for all pollutants. Therefore, air quality impacts from emissions from ground transportation vehicles at PMRF due to the proposed action would be not significant.

Launch. Launches of solid propellant missiles at PMRF have been previously analyzed in the PMRF Enhanced Capabilities EIS. (U.S. Department of the Navy, 1998) The largest target proposed for launch at PMRF is the SR19/SR19. Although this target consists of two SR19 stages, emissions in the vicinity of the launch site would only occur from the first stage. The PMRF Enhanced Capabilities EIS analyzed air quality impacts at PMRF of STARS targets, which are larger than and have greater combustion emissions than the SR19 boosters (see Exhibit 4-18). That document stated that previous analyses of pre- and post-launch air quality confirmed that there would be no exceedances of guidance levels at any public exposure location from launches of STARS targets. There are short-term exceedances within the ground hazard area. However, the ground hazard area would be evacuated prior to launch, and no air quality impacts would be anticipated. Therefore, impacts on air quality from launches of FTF targets under the proposed action would be not significant.

Exhibit 4-18. Combustion Products for SR19-AJ-1 and STARS, Lance, and Liquid-Fueled Targets, kilograms (pounds)

Species	SR19-AJ-1[1]	STARS[2]	Lance[3]	Liquid-Fueled[3]
Al_2O_3	1,767 (3,886)	3,558.80 (7,845.67)	0 (0)	0
CO	1,327 (2,919)	2,355.86 (5,193.70)	20 (44)	982 (2,160)
HCl	1,402 (3,084)	1,576.55 (3,475.64)	<1 (<1)	0
N_2	545 (1,200)	894.42 (1,971.82)	191 (420)	674 (1,485)
H_2O	776 (1,708)	598.16 (1,318.70)	253 (558)	961 (2,117)
H_2	117 (257)	219.83 (484.63)	1 (1)	38 (83)
CO_2	288 (633)	211.34 (465.63)	211 (464)	922 (2,030)
Other	74 (164)	19.81 (43.68)	18 (39)	9 (20)

1 Source: Wake Island EA (SSDC, 1994b)
2 Source: STARS EA (SSDC, 1990)
3 Source: PMRF Enhanced Capabilities EIS (U.S. Department of the Navy, 1998)

The launch of Lance and Liquid Fueled Missiles was analyzed in the PMRF Enhanced Capability EIS. (U.S. Department of the Navy, 1998) The PMRF Enhanced Capability EIS noted that the exhaust emissions from liquid propellant missiles generally have less impact on air quality than those of equivalent sized solid-fueled missiles. Because the LPT proposed to be launched at PMRF has approximately 3,855 kilograms (8,500 pounds) of fuel, and is therefore much smaller than previously analyzed solid propellant missiles, there would not be any significant impacts on air quality from the launch of liquid propellant FTF targets from PMRF.

Post-launch. Any post-launch refurbishment activities would meet all applicable rules for VOCs. No air emission permits are required for these operations. With the exception of some minor, localized increases in particulate matter from the occasional brushing of blast residues from the launch tube walls, if necessary, and launch stools, no adverse effects on air quality are expected.

The impacts on air quality from post-launch activities resulting in boosters hitting the ocean have been analyzed in the BMDS PEIS. Impacts would be similar to, but less than those impacts for boosters hitting land because the residual liquid propellants would be released into the ocean rather than the air. Solid propellant, if still in the casing, might continue to burn for some time even under water, possibly impacting air quality. (MDA, 2007a) Because FTF targets would also impact the BOA, impacts would be similar to those discussed in the BMDS PEIS, and minimal impacts on air quality would be expected.

4.8.1.2 Airspace

Pre-launch. Impacts on airspace from pre-launch activities at PMRF could occur from air transportation of the targets to the launch location. Previous analyses have determined that an increase in air transportation operations could affect the airspace of the location where such activities would occur. These documents concluded that, because all operations involving air transportation of targets would be performed in accordance with existing airspace use requirements, impacts on the airspace in all locations would be not significant. Air transportation associated with FTF launch would be in accordance both existing airspace use requirements and PMRF standard operating procedures, therefore no significant impacts would be expected.

Launch. Proposed FTF target launches from PMRF would not alter existing controlled and uncontrolled airspace in the PMRF ROI. Missiles would be well above FL 600 (18,288 meters [60,000 feet]) and still be within the R-101 Restricted Area, which covers the surface to unlimited altitude, within 1 minute of the rocket motor firing. Aircraft are routinely excluded from the restricted area during missile launches. All other local flight activities occur at sufficient distance and altitude such that the PMRF target launches would not require changes to or create a hazard to these flight activities.

Post-launch. If debris from FTF targets falls into the ocean, MDA would not recover it. Therefore, helicopters and other equipment would not be used, and no impacts on airspace would be expected.

4.8.1.3 Biological Resources

Pre-launch. Pre-launch activities for the launch of solid propellant targets from PMRF would have no impact on biological resources.

Launch. Normal launch activities would not be expected to impact vegetation. Analysis provided in the STARS EA concluded that although vegetation near the STARS launch pad could suffer some temporary distress from the heat generated at launch and from HCl or Al_2O_3 emissions, there is no evidence of any long-term adverse effect on vegetation from two decades of launches at PMRF. The continued presence of the adder's tongue, a species removed from the list of Federal Candidate species, indicates that emissions from STARS missiles have not had a significant impact on sensitive vegetative species. (MDA, 2002c) Based on these previous studies and observations, launches under the proposed action would not be expected to significantly impact vegetation.

Disturbance to wildlife from the launches would be brief and is not expected to have a lasting impact nor a measurable negative effect on migratory bird populations. No evidence has indicated that serious injuries would result to wildlife. Consequently, no long-term adverse effects are anticipated under the proposed action.

The potential impact to Essential Fish Habitat from nominal launch activities would mainly be from spent boosters and target debris to waters off the coast within the Temporary Operating Area. Although spent boosters and debris could affect any species close to the surface, the number of individuals injured or killed would not likely affect overall species' populations. The majority of propellant would be expended before booster drop and impact and thus only trace amounts of propellant would be left, which would minimize the potential for toxic effects. (MDA, 2002c) Therefore, no significant adverse impacts on Essential Fish Habitat would be anticipated under the proposed action.

Based on prior analyses and the observed effects of past target and missile launch activities, the potential impacts of FTF Program activities on sensitive biological resources would be minimal.

Post-launch. The intermittent movement of trucks and any repair/cleanup/waste-handling equipment would not produce substantial levels of noise, and vehicles normally would remain on paved or gravel areas. Thus, the limited actions associated with post-launch operations would have no adverse effects on local vegetation or wildlife, including threatened and endangered species, and critical and other environmentally sensitive habitats.

The biological impacts of post-launch activities resulting in motors and boosters hitting the ocean have been analyzed in the BMDS PEIS. Expended motors and boosters hitting the ocean surface would impart a considerable amount of kinetic energy to the ocean water upon impact. For example, interceptors would hit the water with speeds of 91 to 914 meters (300 to 3,000 feet) per second. The shock wave from their impact with the water would be similar to that produced by explosives. Depending on the water depth, strong waves from the impact may detach kelp strands from the sea floor. During successful missions, boosters would impact in deep open ocean waters. At close ranges, injuries to marine mammal internal organs and tissues would likely result. However, the density of marine species including marine mammals generally decreases, and the corresponding probability of impact decreases, as the distance from the shore increases. Injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 (6 in 10,000) marine mammals exposed per year). (MDA, 2007a) Due to the infrequency of proposed FTF launches and the low probability of marine mammal injury, the proposed action would not be expected to adversely impact marine mammals.

Impacts on marine biological resources from releases of residual propellants from liquid propellant boosters would not be significant. The natural buffering capacity of sea water and the strong ocean currents would neutralize the reaction to any release of liquid propellants associated with FTF targets. Any solid rocket propellant expelled from a destroyed or exploded rocket motor that fall into the ocean would most likely sink to the ocean floor at depths of thousands of meters. At such depths, the propellant parts would be located away from feeding marine mammals. (MDA, 2007a) Therefore, marine animals would not be impacted from ingesting the solid propellant associated with FTF targets.

4.8.1.4 Cultural Resources

Pre-launch. Hydrazine fueling would be conducted using impermeable barriers. Adherence to these procedures would minimize the potential for spills and any impacts on cultural resources. Impacts on cultural resources from other pre-launch activities would not be anticipated.

Launch. Potential impacts on archaeological resources could occur as a result of flight termination debris striking the ground where surface or subsurface deposits are located. However, the likelihood of this occurring would be remote. Personnel would be informed of the sensitivity of cultural resources and the types of penalties that could be incurred if sites are damaged or destroyed. No impacts on cultural resources are anticipated during FTF target launches at PMRF. However, if during operation at any cultural items are discovered, activities would cease in the immediate area and the Hawaii SHPO would be notified through the host installation. Subsequent actions would follow the guidance provided.

Post-launch. Because of the limited activities associated with post-launch operations, no additional ground disturbance or facility modification would occur. However, because personnel would be on site during cleanup and site maintenance, the potential for unauthorized artifact collection still exists. Personnel would be reminded of the sensitivity of cultural resources and the issues of inadvertently damaging or destroying such resources. Thus, no impacts on cultural resources would be expected to occur.

4.8.1.5 Geology and Soils

Pre-launch. The potential for soil contamination resulting from accidental spill of toxic materials during launch preparation is unlikely because spill prevention measures would be followed. Therefore impacts on geology and soils from accidental spills are not expected to be significant.

Launch. Soil testing in the surrounding area of existing launch sites has failed to show any significant soil contamination resulting in public health and safety risks, with most soil chemical levels at ambient conditions. (MDA, 2002c) Potential geology and soils impacts from launch activities would be minor and would occur on previously disturbed areas at existing launch sites. It is possible that areas around FTF launch sites would experience slightly elevated levels of Al_2O_3 and HCl; however, these impacts would be localized and would not result in any significant impact on geology and soils.

Post-launch. No impacts on geology and soils would be expected from debris falling into the ocean due to the depth of the ocean where debris would impact.

4.8.1.6 Hazardous Materials and Waste

Pre-launch. The proposed staging activities for the FTF Program would require storage, use, and eventual disposal of small quantities of hazardous materials and waste. This would include various solvents and cleaners, paints and primers, adhesives, and lubricants. The launch of SR19, Castor IVB, SR19/SR19, and LV-2 targets would require loading of a small amount of hydrazine into the ACM ACS just before launch. Approximately 114 kilograms (250 pounds) of hydrazine (two canisters) and associated fueling equipment would be shipped via air to the staging locations.

All applicable Military, Federal, and state regulatory compliance requirements would be enforced for existing and new waste streams, and hazardous or toxic materials. Liquid fueling would be accomplished in accordance with OSHA and CERCLA guidelines for handling hazardous and toxic materials, and in accordance with Safety SOPs that would be developed for the handling of hydrazine. Handling of hydrazine would be by personnel trained in the safety measures relating to the transportation and fueling process of these liquid fuels.

Because of the relatively small quantities of hazardous materials used and waste that would be generated by the proposed FTF activities, and the ongoing enforcement of compliance requirements for their use, storage, and disposal, no impact on existing hazardous waste management operations would be expected.

Launch. The FTF solid propellant targets would be similar to past missile systems launched from PMRF and would follow the same hazardous materials and hazardous waste handling procedures developed under existing plans. The types of hazardous materials used and hazardous waste generated would be similar to current materials and would not result in any existing procedural changes to the hazardous materials and hazardous waste management plans currently in place.

During launches of FTF targets there is the potential for a mishap to occur, resulting in potentially hazardous debris and propellants falling within the ground hazard area. As addressed for previous launch programs on PMRF, the hazardous materials that result from a flight termination or mishap would be cleaned up, and any contaminated areas would be remediated in accordance with existing PMRF emergency response plans and hazardous materials and hazardous waste plans. All hazardous waste generated in such a mishap would be disposed of in accordance with appropriate state and Federal regulations. Overall, no adverse impacts would result from hazardous materials used or hazardous waste generated during FTF target launches at PMRF.

Post-launch. Post-launch refurbishment and blast residue removal are all routine post-launch activities. During this process, all hazardous materials and associated wastes would be responsibly managed in accordance with the well-established policies and procedures. All hazardous and non-hazardous wastes, including industrial wastewater from launch pad catchments, would be properly disposed of, in accordance with applicable Federal, state, local, DoD regulations. Hazardous material and waste-handling capacities would not be exceeded, and management programs would not have to change. As a result, no adverse impacts from the management of hazardous materials and waste would be expected.

The impacts of post-launch activities resulting from boosters hitting the ocean have been analyzed in the BMDS PEIS. Accordingly, no significant impacts to the ocean environment would be expected from post-launch activities involving liquid propellant missile. During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In freshwater at 20^oC (68^oF), it is likely to take over a year for the perchlorate contained in solid propellant to leach out into the water. Lower water temperatures and more saline waters would likely slow the leaching of perchlorate from the solid propellant into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations. (MDA, 2007a) Therefore, post-launch impacts related to hazardous materials and waste are not anticipated to be significant.

4.8.1.7 Health and Safety

Pre-launch. The SR19, Castor IVB, SR19/SR19, and LV-2 targets would use hydrazine, and onsite loading into the ACM ACS would be required. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area. Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any small leaks/spills would be contained in a drip pan partially filled with water. Water would be added to larger leaks/spills to dilute the hydrazine and moist absorbent pads/booms would be used to contain and isolate the release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release. No impacts on the general public would be expected.

Launch. Missile launch operations within the military have been conducted for many years. Safety requirements have been developed based upon the lessons learned during this time. While there will always be risks associated with launch activities, standard safety procedures would reduce the risks to an acceptable level.

Normal target testing operations would not entail any increased hazards at PMRF since normal system performance is considered to be a safe operation. In the event of a launch accident, there is the potential for significant hazards associated with debris impact, explosion, and release of toxic combustion products. In accordance with the Range Safety Manual, an LHA would be established around the launch facility. This area represents the footprint of maximum hazard associated with debris impact and explosive overpressure. Any personnel inside this footprint area would remain within facilities rated to provide adequate blast and debris protection and protection from exposure to any fuels or chemicals that might be spread as a result of a catastrophic missile failure. Therefore the risk of a significant health and safety impact resulting from such a failure is considered not significant. No significant health and safety impacts would be expected from FTF target launches.

Post-launch. Post-launch refurbishment and blast residue removal are routine operations at a launch site. All applicable Federal, state, and local health and safety requirements, such as OSHA regulations, would be followed, as well as all appropriate DoD regulations. By adhering to the established safety standards and procedures, the level of risk to military personnel, contractors, and the general public would be minimal. Consequently, no significant impacts on health and safety would be expected.

There is the potential for impact of debris from FTF boosters at any point along the flight corridor due to target malfunction and/or termination of the flight by the FTS. The resulting debris would follow a ballistic trajectory and would impact in designated impact areas in the ocean. Because an exact point of termination cannot be determined, the potential effects footprint is determined by considering the limits of debris fallout based on destruction of a target at the boundaries of the acceptable flight corridor, along with additional flight time based on the time required to initiate the FTS. (MDA, 2007a) The possibility of debris hitting the ground or water outside the designated impact area is remote; therefore, safety impacts of flight termination would not be significant. Debris modeling and analysis would be conducted for specific proposed activities as appropriate.

4.8.1.8 Land Use

Pre-launch. Pre-launch activities would have no impact on PMRF's land use patterns.

Launch. Overall, no adverse impacts on land use would occur from FTF target launches. Activities similar to those being proposed were assessed in the PMRF Enhanced Capability EIS and found to be consistent with the Hawaii Coastal Zone Management Act. (MDA, 2002c) All correlated FTF activities would be consistent to the maximum extent practicable with the existing restrictive easement, land use plans, and the Hawaii Coastal Zone Management Program. A Negative Determination is not required.

Post-launch. There would be no land use issues associated with post-launch activities as post-launch cleanup and refurbishment of the launch site would put the site back to its pre-launch condition. Debris would fall into the BOA and sink into the ocean causing no impacts on land use.

4.8.1.9 Noise

Pre-launch. The proposed pre-launch activities at PMRF would cause no noise impacts.

Launch. FTF launch noise levels outside of the ground hazard area boundary for the proposed launch areas, where non-essential personnel and the public are excluded, would not exceed either DoD or OSHA safety requirements. Personnel would wear hearing protection devices when applicable. Personnel and the public outside of the ground hazard area may be startled, awakened, or distracted by the launch noise, especially those in Polihale State Park. STARS launch noise was measured at Kekaha at 54 dBA, near ambient background levels for this location. (MDA, 2002c) FTF launches from northern PMRF should also not affect the residential areas in Kekaha. As in the past, it is not expected that any noise complaints would be generated from FTF launches at PMRF because of the infrequent nature and short duration of the launches themselves. Based on the limited number of launches proposed per year and the brevity of launch events, FTF launches would not be expected to have a significant impact on noise.

Post-launch. Because of the limited activities associated with post-launch operations, limited amounts of noise would be generated. Thus, no significant increases in ambient noise levels would be expected.

4.8.1.10 Socioeconomics

Pre-launch. FTF target launches would help maintain the economy of Kauai, as the number of personnel involved in pre-launch and launch activities is limited to an average of 30 per day, with a peak 65 per day. This small contingent would mostly be transient, using local hotel and lodging facilities, where supply exceeds demand. Overall, no significant socioeconomic or environmental justice impacts would be anticipated from pre-launch activities.

Launch. During launches, some individuals and groups would be excluded from the waters in the LHA. Some of the activity restricted by the launch would be displaced to other locations. For the purposes of this analysis, it is assumed that three main groups would be excluded from the waters offshore of the PMRF FTF launch site: residents, tourists, and commercial fishermen. Each launch would exclude these potential visitors for approximately 4 hours. If the majority of residents and visitors that use the waters within the LHA do so between 10:00 AM and 4:00 PM, then the average access time available in a year would be approximately 2,190 hours. If seven launches are performed in one year, the action would exclude individuals for approximately 28 hours, or approximately 1 percent of the total access time. Even in the event that none of those residents and visitors excluded from the LHA would be prepared to accept as a substitute other areas outside the LHA, this percentage is too small to suggest adverse impact.

The exclusion of fishing vessels from the waters surrounding PMRF is carefully planned, with sufficient warning and access to a hotline information system, to allow fishermen to visit alternative waters. The short periods of exclusion caused by this action, therefore, would have no adverse impact on the commercial fishing industry. Overall, no significant socioeconomic or environmental justice impacts are anticipated from FTF target launch activities.

Post-launch. No socioeconomic or environmental justice impacts would be anticipated from post-launch activities.

4.8.1.11 Transportation

Pre-launch. Transporting missiles and related equipment to the airfield at PMRF by U.S. Air Force Air Mobility Command aircraft is a normal activity at PMRF. All transportation within the continental U.S. and Hawaii would be performed in accordance with all applicable regulations and appropriate safety measures would be followed. Once the targets arrive at the PMRF airfield they would be handled in accordance with PMRF's SOPs. Transportation of FTF target components would be similar to that performed for other missile systems in use at PMRF and would not result in substantial impacts on the transportation system of PMRF or the surrounding area.

Launch. NOTMARs would be issued when a launch has the potential to impact marine areas and would allow marine vessels to clear the affected area; thus launch activities would have no impact on marine transportation. NOTAMs would be issued prior to launch events that would notify pilots of proposed airspace closures. No adverse impacts on transportation would be expected from FTF Program activities

Post-launch. Debris from boosters may fall into waters normally occupied by commercial shipping. The majority of international trade uses routes of least distance. The actual debris impact area for boosters would be small and would depend upon the individual flight path. Prior warning of proposed launch activities through issuances of NOTMARs would enable commercial shipping to follow alternative routes away from the proposed debris impact area, thus no impact would be expected.

4.8.1.12 Visual Resources

Pre-launch. Because proposed launch activities would occur on existing test ranges and no new construction would occur, no impacts on visual resources are anticipated.

Launch. Based on the brevity of launch events and the infrequency of FTF target launches proposed at PMRF, target launches would not significantly impact the visual landscape at PMRF.

Post-launch. Because of the limited scope of FTF post-launch activities at PMRF, no impacts on visual resources would be expected.

4.8.1.13 Water Resources

Pre-launch. No impacts on water resources would be expected from FTF pre-launch activities at PMRF.

Launch. Under nominal launch conditions, no water resource impacts would be expected because nearly all rocket motor emissions would be rapidly dispersed to nontoxic levels away from the launch site. A qualified accident response team would be stationed at the launch site to negate or reduce the environmental effect in the unlikely event of an early adverse flight failure. Toxic concentrations of emission products and missile debris would be rapidly buffered and diluted by the alkaline sea and limited to within a few meters (feet) of the source.

Post-launch. No adverse impacts on water resources on PMRF would be expected from post–launch activities.

4.8.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Under alternative 1, LV-2 and SR19/SR73 would not be staged at PMRF. Because the overall number of targets staged at PMRF would not change, the potential impacts from staging would be as described for the proposed action. Potential environmental impacts from land launch of FTF targets from PMRF would be the same under alternative 1 as under the proposed action.

4.8.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. Pre-launch, launch, and post-launch activities involving SR19/SR73 or LV-2 would not occur from PMRF as proposed. MDA would continue to launch those target configurations from PMRF with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at PMRF from the proposed action and existing planned launch activities would continue to occur.

4.9 White Sands Missile Range, New Mexico

WSMR would serve as a land launch location for both solid and liquid propellant FTF targets. Pre-launch activities at WSMR would include pre-launch storage and pad setup activities. There are no physical site preparation and construction activities anticipated at WSMR. Launch activities at WSMR would include launch and flight of solid and liquid propellant targets. The launching of targets would occur from existing launch sites. Post-launch activities would include clearing debris from the launch area and debris recovery efforts.

Many of the pre-launch, launch, and post-launch activities described in these sections are routine actions at WSMR and have been previously analyzed and shown to have no significant impact. Sea transportation will not occur at WSMR and therefore will have no impact. Pre-launch pad setup activities may have the potential to impact hazardous waste and health and safety at WSMR and therefore are analyzed in this EA, however, no impact would be anticipated for any other resource areas for these activities.

The launch of liquid and solid propellant targets has been previously analyzed in the BMDS PEIS. (MDA, 2007a) The analyses and impacts described in this EA have been tiered from the BMDS PEIS. Additionally, site specific impacts of the launch of liquid propellant targets at WSMR have been analyzed in the WSMR New Mexico LPT EA [WSMR EA (MDA 2002a)]. The site specific impacts of the launch of solid and liquid propellant targets at WSMR have been analyzed in the WSMR Range-Wide EIS [WSMR EIS (WSMR, 1998)] and the Airborne Laser Supplemental EIS [ABL SEIS (MDA, 2003c)]. The findings of these documents are summarized below and any impacts specific to the FTF Program are discussed in the appropriate sections.

4.9.1 Proposed Action

4.9.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to WSMR could occur from truck and air transportation of the target to the launch location.

As described in Section 2.6, a maximum of three roundtrip target shipments per year to and from WSMR would occur under the proposed action. Three roundtrip shipments would increase the number of landings and takeoffs at Holloman AFB by up to a maximum of 48 flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that three FTF launches would occur at WSMR each year, the maximum amount of annual emissions at Holloman AFB due to aircraft transport would be 0.26 metric tons (0.29 tons) of HC, 1.04 metric tons (1.14 tons) of CO, 1.32 metric tons (1.45 tons) of NO_X, and 0.048 metric tons (0.053 tons) of SO_2 Holloman AFB is in Otero County, New Mexico, and Otero County is considered in attainment for all Federal NAAQS. The total emissions from air transport shipments of FTF targets to and from Holloman AFB would be below any Federal *de minimis* quantities, therefore the emissions from the additional flights to and from the base would not cause a significant impact on air quality.

Once at Holloman AFB, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel 32 kilometers (20 miles) one way over local roads from Holloman AFB to the launch site at WSMR. Exhibit 4-19 presents the estimated emissions per mile for each truck during ground transportation.

Exhibit 4-19. Ground Transportation Emissions WSMR

Pollutant	Emissions in Grams per Mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year, metric tons (tons)
VOC	1.100	0.00004 (0.00004)	0.0016 (0.0018)
CO	6.461	0.00026 (0.0003)	0.009 (0.01)
NO_X	15.434	0.0006 (0.0007)	0.02 (0.02)
PM_{10}	0.316	0.00001 (0.00001)	0.0005 (0.0006)
SO_2	0.346	0.00001 (0.00001)	0.0005 (0.0006)

1 The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to be 40 miles.

The increased emissions from an additional 12 trucks three times per year traveling a maximum of 64 kilometers (40 miles) would be extremely small. The estimated emissions from trucks transporting the FTF target and its support equipment from Holloman AFB to the launch location at WSMR would be significantly below the Federal *de minimis* levels for all pollutants. Therefore, emissions from ground transportation vehicles transporting FTF targets at WSMR would not significantly impact air quality.

Launch. The largest target proposed to be launched from WSMR is the SR19 with a total propellant mass of 6,238 kilograms (13,752 pounds). The WSMR EIS analyzed the impacts of launching the SR19 from WSMR and determined that a nominal SR19 launch caused negligible impacts to ground-level ambient air quality. No exceedances of AADC or guidelines were predicted for SR19 launch. Because the launch analyzed in the WSMR EA is identical to the largest target launch proposed for the FTF Program, no exceedances of AADC or guidelines would be expected from FTF launches at WSMR.

Launch of a representative liquid propellant target requiring approximately 825 kilograms (1,815 pounds) of main fuel, 2,920 kilograms (6,425 pounds) of oxidizer and 30 kilograms (66 pounds) of initiator fuel was analyzed in the WSMR EA. (MDA, 2002a) The primary exhaust products of liquid propellant targets are CO, CO_2, hydrogen, nitrogen, and water. The WSMR EA concluded that due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have minimal impact on air quality. Also launches are brief, discrete events, and favorable wind conditions in the region would result in dispersal of combustion products over large areas and would not affect compliance with air quality data. (MDA, 2002a)

The representative liquid propellant target analyzed in the WSMR EA is slightly larger than the FTF liquid propellant target proposed to be launched from WSMR; therefore, the emissions from the launch of FTF liquid propellant targets would be expected to have minimal impact on air quality. Launches of liquid propellant targets would also use triethylamine and dimethylaniline as initiator fuel. The initiator fuel would have emissions similar to those discussed for solid propellant boosters; however, the quantities involved would be significantly smaller. Therefore, emissions from the launch of liquid propellant boosters would be expected to have minimal impact on air quality.

Post-Launch. The amount of residual propellant in the booster when it hits the ground would depend on several factors including how much propellant was in the booster at launch and how far the booster traveled during the mission. A non-pre-fueled liquid propellant booster could impact the ground with approximately 265 liters (70 gallons) of fuel and approximately 473 liters (125 gallons) of oxidizer remaining. The residual propellants could burn upon impact, or one or both propellants could be released to the atmosphere without burning. (MDA, 2007a)

If the propellants burn upon impact, short-term impacts to air quality would occur. The impact areas are isolated from inhabited areas and would be evacuated before launch; as such any exceedances of the NAAQS or exceedances of health-based criteria would not endanger anyone. The remote location would allow time and distance sufficient to disperse fumes to a non-hazardous level. Thus, it is not anticipated that combustion of the propellant(s) would result in air quality impacts beyond the immediate impact site.

If one or both propellants were released to the atmosphere without combustion, a resulting short-term air hazard would be expected in the immediate vicinity of the impact. The duration of the hazard and extent of the hazard area would be determined by the amount and type of propellant released, the meteorological conditions, and the impact conditions. (MDA, 2002a) The remote location of the FTF target impact sites and the prevailing weather conditions would provide the time and distance required to disperse the pollutants to non-hazardous levels before reaching inhabited areas of the range.

Residual propellant from solid propellant boosters would likely continue to burn until expended if encased; however, if released from the motor casing, it is possible that solid propellant would not burn completely. This combustion would have a minor impact on air quality. There is a possibility that the burning solid propellant if encased could start a fire on the ground. The resulting fire could impact air quality in the area immediately surrounding the impact area. (MDA, 2007a)

SOPs would be developed to establish appropriate response and recovery procedures and would include personal protective equipment and determination of appropriate recovery zone hazard boundaries. Propellant released after a test or termination would be handled in accordance with the WSMR Installation Spill Contingency Plan. Therefore, no significant impacts would be expected.

4.9.1.2 Airspace

Pre-launch. Impacts on airspace from pre-launch activities at WSMR could occur from air transportation of the targets to the launch location. However because all operations involving air transportation of FTF targets would be performed in accordance with existing airspace use requirements, impacts on the airspace would be not significant. Air transportation associated with the FTF Program would be in accordance with both existing airspace use requirements and WSMR's SOPs, therefore no significant impacts on airspace would be anticipated.

Launch. Target launch and flight would be contained with the R-5107 complex airspace, a special-use airspace specifically designated to segregate military operations from civilian and commercial airspace users. R-5111 would also be used when the Western Call-up area is used. (MDA, 2002a) FTF Program launches would not affect airborne activities and would not interfere with any low- or high-altitude en route airways or jet routes typically used by civilian and commercial airplanes. Although military airspace use within this complex would be affected, coordination with the FAA and Holloman AFB would minimize any adverse effects on military aircraft operations.

Post-launch. Helicopter retrieval of debris, if necessary, would be within the boundaries of the WSMR airspace complex and would have no impact on the navigable airspace or airborne activities outside the restricted complex airspace.

4.9.1.3 Biological Resources

Pre-launch. There would be no impacts on biological resources from pre-launch activities for solid propellant boosters. For non-pre-fueled liquid propellant boosters, no more than a few grams of propellant would be released during normal fueling operations and appropriate responses to leaks and releases would be implemented to minimize the hazard to biological resources. All propellant loading would be conducted using impermeable barriers appropriate for this type of activity, which would minimize the potential for a spill to impact biological resources. Personnel would be instructed to avoid all contact with any wildlife that may be encountered during launch preparation activities. Therefore, no significant impacts on biological resources would be anticipated from pre-launch activities.

Launch. FTF Launch activities would take place in previously disturbed areas and generally are not expected to adversely affect plant species. Target missile debris would be contained within the WSMR boundaries and could result in the negligible loss of some vegetation over a small portion of WSMR. The types of vegetation that could be impacted include desert scrub, forest, and grassland. Adverse impacts to vegetation from FTF launches are not expected. However, fire from a launch mishap could impact any plant species that may be present near the launch site. The FTF Program would use existing launch sites where much of the vegetation has previously been removed. Any ground fire would be quickly extinguished, where possible, minimizing impacts to vegetation remaining in the area. Moreover, emergency fire fighting personnel would be on stand-by status for all launch activities as a protective measure.

FTF target launches at WSMR could have impacts on wildlife resulting from noise and launch, and debris impacts. Missile flight trajectories would be planned to avoid impact in the San Andres National Wildlife Refuge and other sensitive habitats such as pupfish habitat and would adhere to requirements of the agreement between the National Park Service and WSMR, which states that no planned debris will impact in the White Sands National Monument. (MDA, 2002a) Program personnel would comply with USFWS- and WSMR-adopted procedures developed to protect nesting raptors and other species of special concern, such as avoidance of nests and the use of raptor-safe utilities.

Because FTF target launches would be relatively infrequent events at WSMR, disturbance to wildlife would be brief and would not be expected to have a lasting impact nor a measurable negative effect on wildlife. Launch emissions from liquid propellant FTF targets would have the potential to impact biological resources, but the impact would be minimal. Based on the results of previous studies, low-level short term exposure to HCl or Al_2O_3 emissions from solid propellant FTF target launches would not cause significant damage to vegetation or wildlife.

Post-Launch. The recovery of debris could involve the use of a light-lift helicopter in rough terrain. Low altitude helicopter flights, which are known to cause panicky reactions in some wildlife species, would be intermittent, would involve gradual descents when necessary, and would then return to altitudes that would avoid further startling effects. Debris recovery is an ongoing effort at WSMR and a biologist or other qualified representative would accompany the debris recovery team, if determined necessary by the WSMR Directorate of Public Works, to assist in minimizing the potential for additional impacts. (MDA, 2002a) The FTF Program would limit low altitude helicopter flights and permit appropriate persons to accompany the debris recovery team; therefore no significant biological impacts would be expected from post-launch activities.

4.9.1.4 Cultural Resources

Pre-Launch. All propellant loading would be conducted using impermeable barriers. Adherence to these procedures would minimize the potential for spills and any impacts to cultural resources. Impacts on cultural resources from other pre-launch activities would not be expected.

Launch. Potential impacts on archaeological resources could occur as a result of flight termination debris striking the ground where surface or subsurface archaeological deposits are located. The probability of this occurring would be remote; therefore, significant impacts on cultural resources from FTF target launches would not be expected.

Post-Launch. FTF target launch debris recovery would be in accordance with the WSMR SOP for Environmental Protection During Recovery Action. This SOP focuses on guidelines for avoidance of known sensitive areas on WSMR (e.g., Salt Creek and other White Sands pupfish habitat, San Andres National Wildlife Refuge, and Trinity Site National Historic Landmark) but also provides specific guidance for recovery in areas of unknown natural and cultural resources sensitivity.

To further minimize possible detrimental effects, WSMR recovery procedures in areas with a high probability of cultural resources would include a qualified archaeologist with each recovery team (if determined necessary by the WSMR Directorate of Public Works). If it is determined that during debris recovery there is a potential to disturb cultural resources then activities would be temporarily halted until appropriate Federal or state agencies could be consulted by the WSMR Directorate of Public Works. Range personnel would be instructed concerning the prohibition on collecting cultural resources materials.

In the case of discovery of American Indian burials as a result of ground disturbing activity, the remains would be treated in accordance with the Native American Graves Protection and Repatriation Act.

4.9.1.5 Geology and Soils

Pre-launch. Hazardous pre-launch operations including propellant loading would be conducted in accordance with SOPs approved by the WSMR Directorate of Public Works and all other applicable regulations. All propellant loading would be conducted using appropriate impermeable barriers. Adherence to these procedures would minimize the potential for spills and any impacts to the soils.

Launch. Potential geology and soils impacts from launch activities would be minor and would occur on previously disturbed areas at existing launch sites. LPT missile exhaust emissions would not affect geology and soils.

Post-launch. Target debris and recovery would be conducted in accordance with WSMR Regulation 70-8. Debris recovery and any fire containment actions might cause minor soil disturbances in areas that require vehicle travel off established roads. Off-road travel would cause soil compaction which could result in increased erosion. The amount of off-road travel would be minimal and would not involve multiple traverses along a single track. Therefore, impacts on soil would be not significant. Helicopters might also be used for debris recovery where applicable.

4.9.1.6 Hazardous Materials and Waste

Pre-launch. Propellant loading operations, whether conducted at a fixed, permanent facility or at the launch site, would be conducted according to SOP, which would be designed to minimize hazardous materials impacts to personnel and the environment. It is anticipated that less than approximately 10 grams (0.4 ounce) of oxidizer vapor would be released to the atmosphere. This release would have no health and safety impacts beyond the immediate transfer area. Personnel directly involved in transfer operations would be equipped with appropriate personal protection equipment as per the operating procedures developed

Emergency response planning would be incorporated into the liquid propellant target operations requirement to minimize any impacts due to an unplanned release of hazardous materials. The proposed propellant loading activities are similar in nature to other project actions at WSMR and would not result in an increased hazard in their implementation.

Launch. Non-essential personnel would be evacuated before actual launch, and essential personnel would be removed to protected areas. During a normal launch there would be no hazardous materials or hazardous waste impacts.

It is possible that the target's flight could be terminated early and the missile would impact inside the evacuation zone. The target would fall within the evacuation zone and there would be no impact to personnel or the public from such an accidental release. Emergency response actions would be in accordance with the WSMR Missile Mishap Plan, Annex P to the Disaster Control Plan and would include restricting access to the impact site at a distance sufficient to ensure personal safety.

Although extremely unlikely, in the event of a target launch failure, there is the possibility that an errant target could impact off range. Off range impact would be handled in accordance with RCRA emergency response requirements in accordance with the Military Munitions Rule. The project office emergency response SOP would activate the WSMR Emergency Operations Center (EOC). The EOC would activate the in-place notification rosters for the appropriate WSMR Disaster Plan Annex, depending on the nature of the off range impact area. The EOC activation is the process for involving the functional area specialists who are charged with assuring that environmental and health and safety requirements are met. The WSMR Directorate of Public Works would direct cleanup operations and would coordinate recovery actions with the appropriate agencies.

Post-launch. For a nominal flight, the target would contain unburned propellant when it impacts the range within the planned impact area. The amount of propellant remaining in the missile will vary depending on the particular mission objectives (i.e., distance flown and fuel burned). Target debris and oxidizer or fuel released after a launch or termination, would be handled in accordance with the WSMR Installation Spill Contingency Plan. Release of materials above threshold levels would be reported to the U.S. EPA and to state and local agencies with emergency planning authority as mandated by the Emergency Planning and Community Right to Know Act of 1986. In accordance with the Military Munitions Rule, the WSMR Directorate of Public Works would determine what range clearance and remediation actions are necessary to support WSMR operations.

Entry to the impact site would be restricted to approved hazardous materials response personnel until the area is determined to be safe. Target debris would be rendered safe, loaded onto a truck, and transported to the range residue accumulation point at the former liquid propellant storage site. If access to the debris is not possible with a vehicle, then the debris would be carried by helicopter sling to a nearby road for transport. All debris would be characterized to determine if it is hazardous waste.

Hazardous waste would be disposed of via permitted procedures through the WSMR Hazardous Waste Storage Facility. There would be no on-site treatment of hazardous waste except in the event of an emergency response as allowed in the WSMR RCRA permit.

The proposed action would potentially increase the hazardous waste generated on WSMR. However, this increase in hazardous waste would not overburden the WSMR Hazardous Waste Management Program, and only minimal impact would be anticipated.

4.9.1.7 Health and Safety

Pre-launch. The SR19 target would use a single liquid propellant (hydrazine), and onsite loading into the ACM ACS would be required. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area. Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any small leaks/spills would be contained in a drip pan partially filled with water. Water would be added to larger leaks/spills to dilute the hydrazine and moist absorbent pads/booms would be used to contain and isolate the release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release. No impact on the general public would be expected.

Hazardous pre-launch operations including target propellant loading would be conducted in accordance with SOPs approved by the WSMR Directorate of Public Works and all other applicable regulations. Adherence to these procedures would minimize the potential for health and safety impacts. It is anticipated that releases under normal conditions would be limited to less than 15 grams (0.6 ounce) of gaseous oxidizer and negligible amounts of fuel vapors. Personnel directly involved in propellant loading would wear appropriate personal protection equipment, and anyone not directly involved would be evacuated to a safe distance.

The potential exists for larger accidental releases of oxidizer or fuel. The likelihood of such an occurrence would be remote due to the implementation of the SOPs. The duration and size of the hazard area would vary depending on the amount and type of propellant released and meteorological conditions at the time. SOPs would be developed that include personal protective equipment and safety zones. The WSMR Installation Spill Contingency Plan would be incorporated into the SOP to enable rapid response to any leak and minimize the threat such a leak would pose to personnel and to the environment.

Launch. The principal health and safety concerns would be target malfunctions on or near the launch pad, potential hazards presented by the target following a flight termination, and target impact areas. The WSMR Missile Flight Safety Office must approve all flight plans and trajectories and all planned impact areas. Evacuation areas would be established that would encompass the launch area, flight path, and impact area. These evacuation areas would generally be completely contained within on-range lands.

Personnel inside the evacuation area would be limited to mission essential personnel. Mission essential personnel (specifically those required to be within the evacuation area to conduct the launch) would remain within facilities rated to provide adequate blast and debris protection and to which positive communications would be maintained at all times. The implementation of such safety practices would limit the number of personnel exposed to increased hazards and, as a result, minimal health and safety impacts would be expected.

Post-launch. Debris recovery activities would be conducted in accordance with WSMR SOPs. Target debris and oxidizer or fuel released after a launch or termination would be handled in accordance with the WSMR Installation Spill Contingency Plan. In accordance with the Military Munitions Rule, the WSMR Directorate of Public Works would determine what range clearance and remediation actions are necessary to support WSMR operations. These procedures are designed to prevent impacts on WSMR, program personnel, and the general public.

The duration and size of the actual hazard area resulting from a release of propellant to the atmosphere would vary depending on the amount and type of propellant released and meteorological conditions at the time. SOPs would be developed that include personal protective equipment and safety zones. The WSMR Installation Spill Contingency Plan would be incorporated into the SOP to enable rapid response to any leak and minimize the threat such a leak would pose to personnel and to the environment.

4.9.1.8 Land Use

Pre-launch. FTF target launch evacuations and clearances would be considered normal operations and would have no land use impacts on WSMR.

Launch. Any evacuations that occur due to FTF target launch would remain active throughout the duration of the flight activities. Evacuations would follow normal evacuation procedures; therefore, no impacts on land use would occur during FTF target flight activity.

Land use would change from open area to impact area at any new impact areas. This would affect a very small percentage of the existing open area on WSMR and would be a minor impact, since WSMR in its entirety is a military missile test range. Additional internal WSMR coordination would be required to effect the change in land use.

Post-launch. Post-launch debris recovery activities would be coordinated with the WSMR Directorate of Public Works in accordance with WSMR SOP and would have no impact on land use.

4.9.1.9 Noise

Pre-launch. Section 2.6 describes the proposed activities associated with transporting the FTF targets and their support equipment via truck and air to the various land launch locations. Up to three additional launches could occur at WSMR per year under the proposed action. The proposed action could result in a maximum of 48 additional flights to and from WSMR and a maximum of 36 additional ground vehicle trips over the base roads.

Noise impacts at WSMR could result from these added flights as well as from the added ground vehicle trips required from the receiving air field to the launch location and back. However, WSMR has been launching rockets with additional vehicle and air transportation demands for many years. Because the proposed number of flights and vehicle trips would not significantly increase current operating rates at WSMR, noise impacts from these additional flights and vehicle trips would not be significant.

Launch. Launches would not add new types or levels of noise to WSMR. Noise levels produced by the launch of FTF targets would be similar to past and current noise levels.

Other than the minor ranching activities in the northern and western Call-up areas, the WSMR Main Post community, and remote testing facilities, the range land areas are essentially void of personnel. There is minor movement of range support personnel throughout all areas of the range. There could be minor noise impacts on personnel in one of the populated areas.

The two areas on WSMR that are considered noise sensitive are the San Andres National Wildlife Refuge in the southwest corner of the range and White Sands National Monument, including the headquarters area on the eastern edge of the range. Additionally, the Bosque Del Apache National Wildlife Refuge lies to the northwest of WSMR. There are other spot locations such as the Oscura Mountains where raptors have been sighted. Noise impacts on biological resources are addressed in Section 4.9.1.3.

Based on previous analysis, FTF target launches would produce short duration (less than one minute) noise levels of approximately 65 dBA, 6.4 km (4 mi) from the launch site. (MDA, 2002a) Test Support personnel not under protective cover supporting a launch would be required by WSMR safety regulations to use hearing protection devices. Personnel under cover would be afforded proper sound protection through sound attenuation building construction.

Given the infrequency of the launches, the short duration of the launch, and similarity to previous launches, adverse public impacts from launch activities would not be expected.

Post-launch. Noise from trucks and helicopters used during recovery operations would also pose a potential impact. The UH-1H helicopter has a noise level in the range of 80 dBA; moreover, each recovery operation should last less than one day. Helicopter flight helmets would provide the required noise attenuation for the crew. Noise impacts from recovery operations are expected to be minor.

4.9.1.10 Socioeconomics and Environmental Justice

Pre-launch. No socioeconomic or environmental justice impacts would be expected from pre-launch events.

Launch. FTF target launch activities at WSMR would require up to 50 temporary personnel for short periods surrounding each launch. Given the normal daily, weekly, and monthly fluctuation of population, employment, and visitors to both WSMR and local communities in the ROI, the need for up to 50 additional temporary personnel would have a small, positive, yet largely unnoticeable effect on population, income, or employment in the ROI. Socioeconomic impacts would essentially be limited to expenditures by the temporary personnel in the local economy, particularly at local hotels/motels and restaurants. No impacts on indigenous, minority, low-income, or children’s populations would be expected.

Post-launch. No socioeconomic or environmental justice impacts would be expected from post-launch events.

4.9.1.11 Transportation and Infrastructure

Pre-launch. FTF liquid propellant targets would be transported to WSMR unloaded. All transportation within the continental U.S. would be performed in accordance with appropriate DOT approved procedures and routing, as well as OSHA requirements and U.S. Army safety regulations. Liquid propellants would be transported in DOT-approved containers. Appropriate safety measures would be followed during transportation of the propellants as required by DOT. Therefore, the transportation of FTF liquid propellant targets to WSMR would have no impacts on transportation.

Launch. NOTAMs would be issued prior to launch events that would notify pilots of proposed airspace closures. No adverse impacts on transportation would be expected from FTF target launches.

Post-launch. Debris recovery efforts would have no impact on transportation.

4.9.1.12 Visual Resources

Pre-launch. Because proposed launch activities would occur on existing test ranges and no new construction would occur, no impacts on visual resources would be expected.

Launch. Based on the brevity of launch events and the infrequency of FTF target launches proposed at WSMR, target launches would not significantly impact the visual landscape at WSMR.

Post-launch. No visual resource impacts would be expected from post-launch activities.

4.9.1.13 Water Resources

Pre-launch. FTF liquid propellant target launch evacuations and road closures would have no impact on water resources. Hazardous pre-launch operations including loading the target with propellants would be conducted in accordance with SOPs approved by the WSMR Directorate of Public Works and all other applicable regulations. All propellant loading would be conducted using appropriate impermeable barriers. Adherence to these procedures would minimize the potential for spills and any impacts on water resources.

Launch. The limited quantities of any hazardous waste that could be produced by launch activities would consist mostly of used or excess solvents and cleaners and would not represent a substantial increase in the quantities of hazardous waste currently generated at WSMR. Existing spill prevention procedures would be implemented to decrease the risk of accidental release of potentially hazardous substances to water resources and containment berms would be placed around storage areas. Therefore, significant impacts on water resources would not be anticipated.

Debris from on-pad failure or explosion could adversely impact water resources. However, implementation of launch SOPs would reduce the potential for on-pad failure or explosion and thus the potential risk of impact on water resources. FTF liquid propellant target exhaust emissions would not appreciably affect surface or ground water.

Post-launch. There is no surface water within the proposed FTF target impact areas. There is a remote possibility that an early flight termination could result in propellant and target debris deposition in water bodies. Liquid propellants would potentially be released to the soil when the liquid propellant target missile lands in the impact area. The WSMR Directorate of Public Works would determine appropriate range clearance and remediation actions to minimize impacts on water resources.

4.9.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Because WSMR is a location proposed to support the land launch of FTF targets and would not serve as a staging location for air-based launches, potential environmental impacts on all resource areas from the launch of FTF targets from WSMR would be the same under alternative 1 as under the proposed action

4.9.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. MDA would continue to launch those target configurations from WSMR with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at WSMR from the proposed action and existing planned launch activities would continue to occur.

4.10 Fort Wingate, New Mexico

FWAD would serve as a land launch location for both solid and liquid propellant FTF targets. Pre-launch activities at FWAD would include pre-launch storage and pad set up activities. There are no physical site preparation and construction activities anticipated at FWAD. Launch activities at FWAD would include launch and flight of solid and liquid propellant targets. The launching of targets would occur from existing launch sites. Post-launch activities would include clearing debris from the launch area; however, launches from Fort Wingate would impact on WSMR by design, debris recovery efforts have been addressed in Section 9, post-launch activities for WSMR.

Many of the pre-launch, launch, and post-launch activities described in these sections are routine actions at FWAD and have been previously analyzed and shown to have no significant impact. Pre-launch pad setup activities may have the potential to impact hazardous waste and health and safety at FWAD, and therefore, are analyzed in this EA; however, no impact would be expected for any other resource areas for these activities.

The launch of liquid and solid propellant targets has been previously analyzed in the BMDS PEIS. (MDA, 2007a) The analyses and impacts described within this EA have been tiered from the BMDS PEIS. The site specific impacts of the launch of solid propellant targets at FWDA have been analyzed in the TMD ETR EIS (SSDC, 1994a) and the PAC-3 Lifecycle EA (SSDC, 1997). The findings of these documents are summarized below and any impacts specific to the FTF Program are discussed in the appropriate sections.

4.10.1 Proposed Action

4.10.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to Fort Wingate could occur from truck and air transportation of the target to the launch location.

As described in Section 2.6, a maximum of one roundtrip target shipment per year to and from Fort Wingate would occur under the proposed action. One roundtrip shipment would increase the number of landings and takeoffs at Kirtland AFB, Fort Wingate's receiving airport, by up to a maximum of 16 extra flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that one FTF launch would occur at Fort Wingate each year, the maximum annual emissions at Kirtland AFB due to aircraft transport would be 0.087 metric tons (0.096 tons) of HC, 0.35 metric tons (0.38 tons) of CO, 0.44 metric tons (0.49 tons) of NO_X, and 0.016 metric tons (0.017 tons) of SO_2. Kirtland AFB is in attainment with most Federal and state AAQS, however, the base and its surrounding area have been designated as "in maintenance status" for CO. Bernalillo County (including Kirtland AFB) is now operating under an approved Limited Maintenance Plan, which went into effect in June 2006 and makes conformity analyses unnecessary. The total emissions from air transport shipments of FTF targets to and from Kirtland AFB would be below any Federal *de minimis* quantities, therefore the emissions from the additional flights to and from Kirtland AFB would not cause a significant impact on air quality.

Once at the Kirtland AFB, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel 120 kilometers (75 miles) one way over local roads to the launch site at Fort Wingate. Exhibit 4-20 presents the estimated emissions per mile for each truck during ground transportation.

Exhibit 4-20. Ground Transportation Emissions Fort Wingate

Pollutant	Emissions in Grams per Mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year, metric tons (tons)
VOC	1.100	0.0002 (0.0002)	0.0024 (0.0026)
CO	6.461	0.00097 (0.001)	0.012 (0.013)
NO_X	15.434	0.0023 (0.0025)	0.028 (0.03)
PM_{10}	0.316	0.00005 (0.00006)	0.0006 (0.0007)
SO_2	0.346	0.00005 (0.0006)	0.0006 (0.0007)

[1] The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to be 150 miles.

The increased emissions from an additional 12 trucks one time per year traveling a maximum of 240 kilometers (150 miles) would be extremely small as shown in Exhibit 4-14. Fort Wingate is in attainment for all Federal NAAQS and the estimated emissions from trucks transporting the FTF target and its supporting equipment from Kirtland AFB to the launch location at Fort Wingate would be significantly below Federal *de minimis* levels for all pollutants. Therefore, air quality impacts from the ground transportation of FTF targets to Fort Wingate would be insignificant.

Pre-launch. The pre-launch activity with the greatest potential for impact would be propellant loading for the liquid propellant target. All propellant loading procedures and associated emergency response plans would be approved by the WSMR Directorate of Public Works before beginning activities.

The target would be loaded with propellant over a period of several days. Although total oxidizer and fuel vapor emissions can vary depending on the propellant transfer equipment used and how it is assembled; only very small amounts (approximately 10 grams [0.4 ounce]) of oxidizer vapors would be released to the atmosphere during the oxidizer transfer operation. A negligible amount of fuel vapors would also be released into the atmosphere during fuel transfers. Meteorological conditions at FWAD generally favor a rapid dispersion of airborne pollutants; therefore, normal propellant loading operations would not be expected to impact air quality.

It is unlikely that a propellant release larger than that described above would occur at FWAD. However, if such an accidental release were to occur, it would most likely occur during propellant loading. Hazard distances would depend on the propellant released, the amount released, meteorological conditions, and emergency response measures taken. SOPs would be developed and would include personal protection equipment procedures and distances at which it would be safe to establish propellant loading operations area boundaries. Establishment of and adherence to these SOPs would minimize the potential hazards to personnel in the unlikely event of an unplanned propellant release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release.

Launch. The TMD ETR EIS analyzed the launch of a representative 2-stage solid propellant target missile (M57A-1/M56A-1). (SSDC, 1994a) The largest target proposed for launch at FWAD is the SR19/SR19. Although this target consists of two SR19 stages, emissions to the launch site area would only occur from the first SR19 stage. The TMD ETR EIS analyzed emissions from the M56A-1 motor individually, and the Wake Island EA analyzed emissions from an SR19 stage. (SSDC, 1994b) The combustion products from both of these stages are similar (see Exhibit 4-21).

Exhibit 4-21. Combustion Products for Representative Target Rocket Motors, kilograms (pounds)

Combustion Products	M57A-1[1]	M56A-1[1]	SR19-AJ-1[2]
Al_2O_3	533 (1,174)	1,472 (3,246)	1,767 (3,886)
CO	420 (927)	1,212 (2,672)	1,327 (2,919)
HCl	331(731)	852 (1,879)	1,402 (3,084)
N_2	135 (297)	382 (842)	545 (1,200)
H_2O	148 (325)	430 (947)	776 (1,708)
H_2	39 (87)	106 (234)	117 (257)
CO_2	48 (106)	106 (233)	288 (633)
Other	3.5 (7.7)	148 (326)	74 (164)
Total	1,658 (3,655)	4,708 (10,340)	6,296 (13,851)

1 Source: SSDC, 1994a
2 Source: SSDC, 1994b

The total combustion products from the launch of a target with an SR19 first stage are not significantly higher than the amounts generated from launch of the representative target (M56A-1/M57A-1). Therefore, emissions impacts would be similar for launches of SR19/SR19 FTF targets. The TMD ETR EIS stated that results from the TSCREEN PUFF computer modeling of a nominal launch of a representative target indicated that emissions of CO and Al_2O_3 would be below the corresponding NAAQS and indicator values. The Short-term Public Emergency Guidance Level for HCl would be exceeded at distances of 1, 3, and 5 kilometers (0.6, 2, and 3 miles). Since there are areas outside the FWAD-specific LHA that are closer than 5 kilometers (3 miles), additional modeling with the Rocket Exhaust Effluent Diffusion Model was performed. Calculations were performed using topographic and meteorological data specific to the FWAD area and for average conditions for all 12 months of the year. For all distances greater than 1 kilometer (0.6 mile) from the launch site, the 1-hour average concentration was less than the 1 part per million SPEGL for HCl. For normal launch conditions, no standards or guidelines would be exceeded for distances as close as 1 kilometer (0.6 mile). (SSDC, 1997) Therefore, impacts on air quality from launching FTF targets at FWAD would be not significant.

The FTF liquid propellant target launches from FWAD would use triethylamine as an initiator fuel. The initiator fuel would have emissions of CO, CO_2, hydrogen, nitrogen, and water less than those previously modeled. Therefore, the emissions from FTF liquid propellant target launches at FWAD would have minimal impact on air quality.

Post-Launch. See Section 4.9.1.1 *Post-Launch*.

4.10.1.2 Air Space

Pre-launch. Impacts on airspace from pre-launch activities at FWAD could occur from air transportation of the targets to the launch location. However, because all operations involving air transportation of targets would be performed in accordance with existing airspace use requirements, impacts on the airspace would be not significant. Air transportation associated with the FTF Program would be in accordance with both existing airspace use requirements and FWAD standard operating procedures, therefore no significant impacts would be expected.

Launch. Target launch and flight would occur within the established restricted areas at FWAD or WSMR. When activated, the restricted areas could potentially impact nonparticipating aircraft operations along portions of Federal victor airways and jet routes, or on direct flights in the vicinity of the Gallup, Socorro, and Truth or Consequences navigational aids. The potential impact of the restricted areas on nonparticipating aircraft operations is lessened by the limited number of planned launches (1 per year), and a U.S. Army agreement to complete test activity prior to 9:00 AM local time when the volume of air traffic in the area is normally low. In addition, the entire launch through impact is designed to take less than 15 minutes total. The FAA would issue NOTAMs to publicize the effective date and times the restricted areas would be active. Restricted areas would be expected to have minimal impact on instrument flight rules traffic. It is possible that activation of the restricted areas may necessitate rerouting of a few aircraft; however, any rerouting should be minimal due to the location, small size, and limited activation time requirements of the areas. The two restricted areas that extend from the surface, R-5117 and R-5123, are designated over government-controlled tracts of land.

All of these restricted areas are joint-use, and would be activated for the minimum time needed to safely accomplish the mission. When not needed, the restricted areas would be released to the FAA controlling agency.

All FTF launches would take place in existing or newly restricted airspace that would be cleared of nonparticipating aircraft. Target flights would be at altitudes well above Class

A airspace with its jet routes when outside of restricted airspace. The FTF launches would be located so as to be little noticed by other local flight activities, resulting in minimal impacts on airspace.

Post-launch. See Section 4.9.1.2 *Post-Launch*.

4.10.1.3 Biological Resources

Pre-launch. For FTF liquid propellant targets no more than a few grams of propellant would be released during propellant loading operations and appropriate responses to releases would be implemented to minimize the impact on biological resources. All propellant loading would be conducted using impermeable barriers appropriate for this type of activity, which would minimize the potential for a spill to impact biological resources.

Launch. Potential impacts to vegetation and wildlife as a result of solid propellant target launches from Fort Wingate have been discussed and analyzed in previous environmental documents including the PAC-3 Life Cycle EA (SSDC, 1997) and the TMD ETR EIS (SSDC, 1994a). The impacts on biological resources from liquid propellant target launches would be the same as those for solid propellant target launches as discussed in the aforementioned documents, with the exception that HCl would not be emitted.

Normal launch activities are not expected to adversely affect vegetation on FWAD. Launch activities would occur in previously disturbed areas. In the event of a launch or early flight termination, debris impact could potentially result in the loss of some plants in the impact areas. However, sensitive, threatened, and endangered plant species tend to be widely scattered and occupy small surface areas. The chance of an individual sensitive plant being struck by falling debris would be remote. The probability of a fire occurring in proximity to a threatened or endangered plant species would also be low. Noise levels and sonic booms from FTF target launches would not adversely affect threatened or endangered species such as the bald eagle or northern goshawk since these species are transient and are normally outside the 90 dBA range. Sensitive wildlife species are widely scattered and the probability of an individual being struck by early flight termination debris would be remote. (SSDC, 1997)

Post-Launch. See Section 4.9.1.3 *Post-Launch*.

4.10.1.4 Cultural Resources

Pre-launch. All propellant loading would be conducted using impermeable barriers. Adherence to these procedures would minimize the potential for spills and any impacts on cultural resources.

Launch. Target launches would take place on previously disturbed areas. The potential for impacts on cultural resources caused by debris from a launch mishap would be very small. All flight preparation personnel would receive orientation involving a definition of cultural resources and their protective Federal regulations. (SSDC, 1997) Consequently, no significant impacts on cultural resources would be expected from the proposed action.

Post-launch. See Section 4.9.1.4 *Post-Launch.*

4.10.1.5 Geology and Soils

Pre-launch. Soil contamination resulting from accidental spill of toxic materials during launch preparation would be unlikely because spill prevention measures would be followed. Therefore impacts on geology and soils from accidental spills would be not significant.

Launch. Potential geology and soils impacts from launch activities would be minor and would occur on previously disturbed areas at existing launch sites. FTF liquid propellant target exhaust emissions would not affect soils.

Post-launch. See Section 4.9.1.5 *Post-Launch.*

4.10.1.6 Hazardous Materials and Waste

Pre-launch. Propellants for liquid fueled targets are hazardous materials. Liquid fuels are flammable; benzene (main fuel) and triethylamine (as initiator fuel). The oxidizer would be IRFNA, which is extremely corrosive. Liquid fueled target missiles would be loaded with propellant prior to launch at the Fort Wingate launch site. Fuel and oxidizer are loaded in separate operations to preclude contact.

If liquid propellant target missiles are used at Fort Wingate, propellants would be transported to Fort Wingate and stored until propellant loading operations are performed. Approximately 3,775 kilograms (8,306 pounds) of liquid propellant would be required for each target. The waste propellants would be collected in empty drums and disposed of according to WSMR Directorate of Public Works regulations. Response to any spill that may occur would be addressed in accordance with the spill response plan, with support from the WSMR Directorate of Public Works. Spill cleanup materials would be containerized and shipped off-site for disposal.

The launch of SR19, Castor IVB, and SR19/SR19 targets would require loading of a small amount of hydrazine into the ACM ACS just before launch. Approximately 114 kilograms (250 pounds) of hydrazine (two canisters) and associated fueling equipment would be shipped via air to the staging locations.

All applicable Military, Federal, and state regulatory compliance requirements would be enforced for existing and new waste streams, and hazardous or toxic materials. Liquid fueling would be accomplished in accordance with OSHA and CERCLA guidelines for handling hazardous and toxic materials, and in accordance with Safety SOPs that would be developed for the handling of hydrazine. Handling of hydrazine would be by personnel trained in the safety measures relating to the transportation and fueling process of these liquid fuels.

Because of the relatively small quantities of hazardous materials used and waste that would be generated by the proposed FTF activities, and the ongoing enforcement of compliance requirements for their use, storage, and disposal, no impact on existing hazardous waste management operations would be expected.

Launch. The proposed FTF liquid propellant launches would generate wastes similar to others generated during ongoing operations at Fort Wingate and would not result in a substantial increase in the total quantities of hazardous waste.

During the launch of liquid propellant targets, the potential exists for a mishap resulting in potentially hazardous debris and propellants falling within the designated LHA or impact zone footprint. The hazardous materials that result from a flight termination would be cleaned up and any contaminated areas remediated. All hazardous waste generated in such a mishap would be disposed of in accordance with appropriate regulations. Overall, no adverse impacts would result from hazardous materials used or hazardous waste generated under the proposed action.

During launches of liquid propellant missiles there is the potential for a mishap to occur that would result in the missile's flight being terminated early and the missile impacting inside the evacuation zone. The missile would fall within the evacuation zone and there would be no impact to personnel or the public from such an accidental release. Emergency response actions would be in accordance with the WSMR Missile Mishap Plan, Annex P to the Disaster Control Plan and would include restricting access to the impact site at a distance sufficient to ensure personal safety. (MDA, 2002a) The FTF Program would comply with the Missile Mishap Plan; therefore impacts on personal safety would be minimized.

Although extremely unlikely, in the event of a target launch failure, there is the possibility that an errant target could impact off range. Off range impact would be handled in accordance with RCRA emergency response requirements in accordance with the Military Munitions Rule. The project office emergency response SOP would activate the WSMR EOC. The EOC would activate the in-place notification rosters for the appropriate WSMR Disaster Plan Annex, depending on the nature of the off range impact area. The EOC activation is the process for involving the functional area specialists who are charged with assuring that environmental and health and safety requirements are met.

The WSMR Directorate of Public Works would direct cleanup operations and would coordinate recovery actions with the appropriate agencies.

The existing hazardous materials storage and handling capabilities at Fort Wingate, and the procedures and infrastructure for handling hazardous waste, are sufficient to ensure that all hazardous materials and waste produced by the proposed FTF operations are handled safely and in accordance with applicable regulatory requirements. Because they would follow SOPs, there would be no significant impact on hazardous materials and hazardous waste management at Fort Wingate from launches of liquid propellant targets.

Post-launch. See Section 4.9.1.6 *Post-Launch.*

4.10.1.7 Health and Safety

Pre-launch. The SR19, Castor IVB, and SR19/SR19 targets would use a single liquid propellant (hydrazine), and onsite loading into the ACM ACS would be required. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area. Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any small leaks/spills would be contained in a drip pan partially filled with water. Water would be added to larger leaks/spills to dilute the hydrazine and moist absorbent pads/booms would be used to contain and isolate the release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release. No impact on the general public would be expected.

Hazardous pre-launch operations including target propellant loading would be conducted in accordance with SOPs approved by the WSMR Directorate of Public Works and all other applicable regulations. Adherence to these procedures would minimize the potential for health and safety impacts. It is anticipated that releases under normal conditions would be limited to less than 15 grams (0.6 ounce) of gaseous oxidizer and negligible amounts of fuel vapors. Personnel directly involved in propellant loading would wear appropriate personal protection equipment, and anyone not directly involved would be evacuated to a safe distance.

The potential exists for larger accidental releases of oxidizer or fuel. The likelihood of such an occurrence would be remote due to the implementation of the SOPs. The duration and size of the hazard area would vary depending on the amount and type of propellant released and meteorological conditions at the time. SOPs would be developed that include personal protective equipment and safety zones. The WSMR Installation Spill Contingency Plan would be incorporated into the SOP to enable rapid response to any leak and minimize the threat such a leak would pose to personnel and to the environment.

Launch. The primary exhaust emissions from liquid propellant targets are CO, CO_2, water, and nitrogen. (MDA, 2002a) Under normal launch circumstances, only a small portion of the emissions would be released near the ground and would have no adverse impact on worker or public health and safety. A launch mishap or early flight termination, though unlikely, could result in the release of liquid propellants including IRFNA and benzene. Propellant-contaminated soil and debris would be collected and disposed of in accordance with SOPs and all applicable regulations for control, clean up, and response for spills.

Release of materials above threshold levels would be reported as required. Therefore, because any release of liquid propellants would be cleaned up as necessary, it would not result in a significant health and safety impact on the public.

Post-launch. See Section 4.9.1.7 *Post-Launch*.

4.10.1.8 Land Use

Pre-launch. FWAD is currently closed and in a caretaker status. The change in land use would not conflict with any Federal, state, or local land use plans.

Launch. Any evacuations that occur due to the LPT testing would remain active throughout the duration of the flight activities. Evacuations would follow normal evacuation procedures; therefore, no impacts on land use would occur during LPT missile flight activity.

Post-launch. See Section 4.9.1.8 *Post-Launch*.

4.10.1.9 Noise

Pre-launch. Pre-launch activities would have no impact on noise.

Launch. The TMD ETR EIS analyzed the noise impacts of the launch of the M56-1 target missile and ERINT defensive missile at Fort Wingate. (SSDC, 1994b) This analysis concluded that the maximum noise level for TMD target missile launches is greater than 128 dBA within approximately 100 meters (328 feet) of the launch site. Exposure to 128 dBA for the short duration of a missile launch is less than 9 percent of the daily exposure permitted by the OSHA. The maximum noise level for TMD missile launches is greater than 115 dBA within approximately 100 meters (328 feet) of the launch site. Exposure to 115 dBA for the short duration of a missile launch is less than 0.4 percent of the daily exposure permitted by the OSHA. However, all personnel would be excluded from the launch area and thus would be protected from noise effects. The

TMD ETR EIS concluded that noise impacts from the launch TMD target missiles would not be significant.

The launch of FTF targets from Fort Wingate would be expected to have similar noise impacts to those discussed for TMD missile launch and thus would cause no significant increase in noise levels.

Post-launch. See Section 4.9.1.9 *Post-Launch.*

4.10.1.10 Socioeconomics and Environmental Justice

Pre-launch. No socioeconomic or environmental justice impacts are anticipated from pre-launch events.

Launch. There would be no impact on population growth from FTF target launches. The economic activity generated by the launches would be relatively small. Approximately 1,250 motel rooms are available in the Gallup area which would easily accommodate the transient personnel required for FTF launch activities (SSDC, 1997). The expected increase in motel and restaurant receipts would benefit the local economy slightly. No adverse economic impacts on landowners and residents in the booster drop area would be expected because they would receive compensation through a pre-negotiated agreement for any inconvenience or property damage that may occur (SSDC, 1997). There would be no impacts on environmental justice under the proposed action.

Post-launch. See Section 4.9.1.10 *Post-Launch.*

4.10.1.11 Transportation and Infrastructure

Pre-launch. Only one FTF target is proposed for launch per year at FWAD. This could involve a maximum of 16 flights to and from Kirtland AFB and up to 12 truck trips from Kirtland to Fort Wingate (240 kilometers [150 miles]). This is a relatively small number of shipments annually; therefore, the transportation of FTF targets to FWAD would not be expected to have impacts on regional transportation.

Launch. NOTAMs would be issued prior to launch events that would notify pilots of proposed airspace closures. Impacts to air transportation are discussed above in Airspace. No adverse impacts on transportation would be expected from FTF Program activities.

Post-launch. See Section 4.9.1.11 *Post-Launch.*

4.10.1.12 Visual Impacts

Pre-launch. Because proposed launch activities would occur on existing test ranges and no new construction would occur, no impacts on visual resources would be anticipated.

Launch. Based on the brevity of launch events and the infrequency of FTF target launches proposed at FWAD, target launch would not significantly impact the visual landscape at FWAD.

Post-launch. See Section 4.9.1.12 *Post-Launch*.

4.10.1.13 Water Resources

Pre-launch. Launch evacuation and road closures would have no impact on water resources. Hazardous pre-launch operations including target propellant loading would be conducted in accordance with SOPs approved by the WSMR Directorate of Public Works and all other applicable regulations. All propellant loading would be conducted using appropriate impermeable barriers. Adherence to these procedures would minimize the potential for spills and any impacts on water resources. Therefore, no significant impacts on water resources are anticipated under the proposed action.

Launch. The limited quantities of any hazardous waste that could be produced by launch activities would consist mostly of used or excess solvents and cleaners and would not represent a substantial increase in the quantities of hazardous waste currently generated. Existing spill prevention procedures would be implemented to decrease the risk of accidental release of potentially hazardous substances to water resources and containment berms would be placed around storage areas. Consequently, impacts on water resources from accidental releases would be minimal.

Debris from on-pad failure or explosion could adversely impact water resources. However, implementation of launch SOPs would reduce the potential for on-pad failure or explosion and thus the potential risk of impact on water resources. Target exhaust emissions would not appreciably affect surface or ground water.

Post-launch. See Section 4.9.1.13 *Post-Launch*.

4.10.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Because FWAD is a location proposed to support the land launch of FTF targets and would not serve as a staging location for air-based launches, potential environmental impacts on all resource areas from the launch of FTF targets from FWAD would be the same under alternative 1 as under the proposed action

4.10.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. Pre-launch, launch, and post-launch activities involving SR19/SR73 or LPT would not occur from FWAD as proposed. MDA would continue to launch those target configurations from FWAD with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at FWAD from the proposed action and existing planned launch activities would continue to occur.

4.11 Yuma Proving Ground, Arizona

YPG would serve as a staging location for FTF targets. Pre-launch staging operations would be performed at YPG. Following staging operations, the FTF target would be loaded into a C-17 aircraft and launched over the BOA. Following target launch, the C-17 would return to the staging location for post-launch cleaning and refurbishment. Therefore, impacts to YPG will be limited to pre-launch and post-launch operations. A discussion of launch impacts can be found in Section 4.16 under the BOA. Because staging is considered a routine activity at YPG, the only activities analyzed will be those unique to the FTF Program. This EA considers air quality impacts associated with transportation of the FTF targets to YPG and target launch.

Additionally, the health and safety and hazardous materials and waste management impacts from handling and loading a small quantity of hydrazine has been analyzed. However, these impacts would be expected to be essentially the same at all proposed staging sites for FTF air launch targets as all are operating bases and as such all staging locations routinely handle hazardous shipments, perform fueling functions and deal with spills or releases of hazardous materials. The analysis for YPG for hazardous materials and wastes and health and safety impacts would be the same for the remaining staging locations and has been referenced.

4.11.1 Proposed Action

4.11.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to the YPG air launch staging location could occur from air transportation of the target to the staging location. Air quality impacts from ground transportation would not occur at YPG because the FTF target would fly to and from the on-site airport and would not be transported over the road.

As described in Section 2.6, a maximum of one roundtrip target shipment per year to and from YPG was assumed for purposes of analysis in this EA. One roundtrip shipment would increase the number of landings and takeoffs at YPG's on-site airport by up to a maximum of 16 flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that one FTF launch would occur at YPG each year, the maximum amount of annual emissions at YPG's airport due to aircraft transport would be 0.087 metric tons (0.096 tons) of HC, 0.35 metric tons (0.38 tons) of CO, 0.44 metric tons (0.49 tons) of NO_X, and 0.016 metric tons (0.017 tons) of SO_2. Air emissions inventories at YPG indicate that levels of criteria air pollutants, VOCs, and HAPs at the facility are well below established Federal and state regulatory standards. Although YPG is classified as non-attainment for PM_{10}, most PM_{10} emissions of concern at the facility result from ground-disturbing activities. YPG implements mitigation measures to reduce the amount of PM_{10} emissions in accordance with a Memorandum of Understanding with the ADEQ and with the SIP. The total emissions from air transport shipments of FTF targets to and from YPG's airport would be below any Federal *de minimis* quantities for non-attainment areas, therefore the emissions from the additional flights into and out of the base would not cause a significant impact on air quality.

Post-launch. No impacts to air quality are expected from post-launch staging activities.

4.11.1.2 Hazardous Materials and Waste

Pre-launch. The proposed staging activities for FTF air launch targets would require storage, use, and eventual disposal of small quantities of hazardous materials and waste. This would include various solvents and cleaners, paints and primers, adhesives, and lubricants. The launch of SR19, Castor IVB, SR19/SR19, and LV-2 would require loading of a small amount of hydrazine into the ACM ACS just before launch. Approximately 114 kilograms (250 pounds) of hydrazine (two canisters) and associated fueling equipment would be shipped via air to the staging locations.

All applicable Military, Federal, and state regulatory compliance requirements would be enforced for existing and new waste streams, and hazardous or toxic materials. Liquid propellant loading would be accomplished in accordance with OSHA and CERCLA guidelines for handling hazardous and toxic materials, and in accordance with Safety SOPs that would be developed for the handling of hydrazine. Handling of hydrazine would be by personnel trained in the safety measures relating to the transportation and fueling process of these liquid fuels.

Because of the relatively small quantities of hazardous materials used and waste that would be generated by the proposed FTF activities, and the ongoing enforcement of compliance requirements for their use, storage, and disposal, no impact to existing hazardous waste management operations would be expected.

Post-launch. Post-launch refurbishment and blast residue removal are all routine post-launch activities. During this process, all hazardous materials and associated wastes would be responsibly managed in accordance with the well-established policies and procedures. All hazardous and non-hazardous wastes, including industrial wastewater from launch pad catchments, would be properly disposed of, in accordance with applicable Federal, state, local, DoD regulations. Hazardous material and waste-handling capacities would not be exceeded, and management programs would not have to change. As a result, no adverse impacts from the management of hazardous materials and waste would be expected.

4.11.1.3 Health and Safety

Pre-launch. The SR19, Castor IVB, SR19/SR19, and LV-2 targets would use hydrazine, and onsite loading into the ACM ACS would be required. A safety briefing would be held prior to loading and hazardous operations checklist would be completed. All persons performing the loading would wear personal protective suits and all non-essential personnel would leave the loading area. Approximately 114 kilograms (250 pounds) of hydrazine would be transferred during fuel loading operations. If an accidental release were to occur, it would most likely occur during loading. A reasonable scenario would involve failure of the transfer equipment or valves. Any small leaks/spills would be contained in a drip pan partially filled with water. Water would be added to larger leaks/spills to dilute the hydrazine and moist absorbent pads/booms would be used to contain and isolate the release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release. No impact on the general public would be expected.

Post-launch. Post-launch refurbishment and blast residue removal are routine operations at a launch site. All applicable Federal, state, and local health and safety requirements, such as OSHA regulations, would be followed, as well as all appropriate DoD regulations. By adhering to the established safety standards and procedures, the level of risk to military personnel, contractors, and the general public would be minimal. Consequently, no significant impacts on health and safety would be expected.

4.11.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Under alternative 1, LV-2 and SR19/SR73 would not be staged at YPG. Because the overall number of targets staged at YPG would not change, the potential impacts from alternative 1 would be as described for the proposed action.

4.11.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. Staging activities involving SR19/SR73 or LV-2 would not occur from YPG as proposed. MDA would continue to stage those target configurations from YPG with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at YPG from the proposed action and existing planned launch activities would continue to occur.

4.12 Hill AFB, Utah

Hill AFB would serve as a staging location for FTF targets. Pre-launch staging operations would be performed at Hill AFB. Following staging operations, the FTF target would be loaded into a C-17 aircraft and launched over the BOA. Following target launch, the C-17 would return to the staging location for post-launch cleaning and refurbishment. Therefore, impacts to Hill AFB will be limited to pre-launch and post-launch operations. A discussion of launch impacts can be found in Section 4.16 under the BOA. Because staging is considered a routine activity at Hill AFB, the only activities analyzed will be those unique to the FTF Program. This EA will consider air quality impacts associated with transportation of the FTF targets to Hill AFB and target launch. Additionally, the impacts on health and safety and hazardous materials and waste from handling and loading a small quantity of hydrazine were analyzed and presented in Sections 4.11.1.2 and 4.11.1.3.

4.12.1 Proposed Action

4.12.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to the air launch staging location at Hill AFB could occur from air transportation of the target to the staging location. Air quality impacts from ground transportation would not occur at Hill AFB because the FTF target would fly into and out of the on-site airport and would not be transported over the road.

As described in Section 2.6, a maximum of one roundtrip target shipment per year to and from Hill AFB was assumed for purposes of analysis in this EA. One roundtrip shipment would increase the number of landings and takeoffs at Hill AFB's on-site airport by up to a maximum of 16 flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that one FTF launch would occur at Hill AFB each year, the maximum amount of annual emissions at Hill's airport due to aircraft transport would be 0.087 metric tons (0.096 tons) of HC, 0.35 metric tons (0.38 tons) of CO, 0.44 metric tons (0.49 tons) of NO_X, and 0.016 metric tons (0.017 tons) of SO_2. Hill AFB is classified as a maintenance area for ozone and as an attainment area for all other NAAQS. Although NO_X emissions are considered precursors to ozone, the total emissions from air transport shipments of FTF targets to and from Hill AFB's airfield would be below the Federal *de minimis* quantities for NO_X and for all other regulated pollutants. Therefore the emissions from the additional flights to and from the base would not cause a significant impact on air quality.

Post-launch. No impacts on air quality would be expected from post-launch staging activities.

4.12.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Under alternative 1, LV-2 and SR19/SR73 would not be staged at Hill AFB. Because the overall number of targets staged at AFB would not change, the potential impacts from alternative 1 would be as described for the proposed action.

4.12.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. Staging activities involving SR19/SR73 or LV-2 would not occur from Hill AFB as proposed. MDA would continue to stage those target configurations from Hill AFB with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at Hill AFB from the proposed action and existing planned launch activities would continue to occur.

4.13 Elmendorf AFB, Alaska

Elmendorf AFB would serve as a staging location for FTF targets. Pre-launch staging operations would be performed at Elmendorf AFB. Following staging operations, the FTF target would be loaded into a C-17 aircraft and launched over the BOA. Following target launch, the C-17 would return to the staging location for post-launch cleaning and refurbishment. Therefore, impacts on Elmendorf AFB will be limited to pre-launch and post-launch operations. A discussion of launch impacts can be found in Section 4.16 under the BOA. Because staging is considered a routine activity at Elmendorf AFB, the only activities analyzed will be those unique to the FTF Program. This EA will consider air quality impacts associated with transportation of the FTF targets to Elmendorf AFB and target launch. Additionally, the impacts on health and safety and hazardous materials and waste from handling and loading a small quantity of hydrazine were analyzed and are presented in Sections 4.11.1.2 and 4.11.1.3.

4.13.1 Proposed Action

4.13.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to the forward air launch staging location at Elmendorf AFB could occur from air transportation of the target to the staging location. Air quality impacts from ground transportation would not occur at Elmendorf AFB because the FTF target would fly to and from the on-site airport and would not be transported over the road.

As described in Section 2.6, a maximum of one roundtrip target shipment per year to and from Elmendorf AFB was assumed for purposes of analysis in this EA. One roundtrip shipment would increase the number of landings and takeoffs at Elmendorf's on-site airport by up to a maximum of 16 extra flights per year. Exhibit 4-4 in the transportation analysis to and from Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that one FTF launch would occur at Elmendorf AFB each year, the maximum amount of annual emissions at the base's airport due to aircraft transport would be 0.087 metric tons (0.096 tons) of HC, 0.35 metric tons (0.38 tons) of CO, 0.44 metric tons (0.49 tons) of NO_X, and 0.016 metric tons (0.017 tons) of SO_2. Elmendorf AFB is in an area classified as in attainment for all criteria pollutants except for the community of Eagle River, 10 miles northeast of Elmendorf AFB, which is designated as nonattainment for PM_{10}. One area adjacent to the southern boundary of Elmendorf AFB is also currently operating under a maintenance plan to assure continued attainment with the CO standard. However, the total emissions from air transport shipments of FTF targets to and from Elmendorf AFB's airport would be below the Federal *de minimis* quantities for PM_{10}, for CO, and for all other regulated pollutants. Therefore the emissions from the additional flights into and out of the base would not cause a significant impact on air quality.

Post-launch. No impacts to air quality are expected from post-launch staging activities.

4.13.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Under alternative 1, LV-2 and SR19/SR73 would not be staged at Elmendorf AFB. Because the overall number of targets staged at Elmendorf AFB would not change, the potential impacts from alternative 1 would be as described for the proposed action.

4.13.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. Staging activities involving SR19/SR73 or LV-2 would not occur from Elmendorf AFB as proposed. MDA would continue to stage those target configurations from Elmendorf AFB with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at Elmendorf AFB from the proposed action and existing planned launch activities would continue to occur.

4.14 Misawa Air Base, Japan

Under the proposed action, Misawa AB would serve as a staging location for FTF air launch targets. Pre-launch staging operations would be performed at Misawa AB. Following staging operations, the FTF target would be loaded into a C-17 aircraft and launched over the BOA. Following target launch, the C-17 would return to the staging location for post-launch cleaning and refurbishment. Therefore, impacts to Misawa AB would be limited to pre-launch and post-launch operations. A discussion of launch impacts can be found in Section 4.16 under the BOA. Because staging is considered a routine activity at Misawa AB, the only activities analyzed will be those unique to the FTF Program. This EA will consider air quality impacts associated with transportation of the FTF targets to Misawa AB and target launch. Additionally, the impacts on health and safety and hazardous materials and waste from handling and loading a small quantity of hydrazine were analyzed and are presented in Sections 4.11.1.2 and 4.11.1.3.

4.14.1 Proposed Action

4.14.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to the forward air launch staging location at Misawa AB could occur from air transportation of the target to the staging location. Air quality impacts from ground transportation would not occur at Misawa AB because the FTF target would fly to and from the on-site airport and would not be transported over the road.

As described in Section 2.6, a maximum of one roundtrip target shipment per year to and from Misawa AB was assumed for purposes of analysis in this EA. One roundtrip shipment would increase the number of landings and takeoffs at Misawa's on-site airport by up to a maximum of 16 extra flights per year. Exhibit 4-4 in the transportation analysis to and from Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that one FTF launch would occur at Misawa AB each year, the maximum amount of annual emissions at the base's airport due to aircraft transport would be 0.087 metric tons (0.096 tons) of HC, 0.35 metric tons (0.38 tons) of CO, 0.44 metric tons (0.49 tons) of NO_X, and 0.016 metric tons (0.017 tons) of SO_2. Although no site-specific air quality data are available for Misawa AB because the base is not subject to U.S. laws, all activities at Misawa AB must comply with the JEGS. Using the Federal NAAQS as threshold criteria for considering impacts on air quality, the total emissions from air transport shipments of FTF targets to and from Misawa AB's airport would be below any Federal *de minimis* levels. Therefore the emissions from the additional flights to and from the base would not cause a significant impact on air quality.

Post-launch. No impacts on air quality are expected from post-launch staging activities.

4.14.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Under alternative 1, LV-2 and SR19/SR73 would not be staged at Misawa AB. Because the overall number of targets staged at Misawa AB would not change, the potential impacts from alternative 1 would be as described for the proposed action.

4.14.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. Staging activities involving SR19/SR73 or LV-2 would not occur from Misawa AB as proposed. MDA would continue to stage those target configurations from Misawa AB with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas at Misawa AB from the proposed action and existing planned launch activities would continue to occur.

4.15 Pearl Harbor, Hawaii

Pearl Harbor would serve as a staging location for FTF sea-launch targets. As discussed in Section 4.2, the use of Pearl Harbor as a staging location has been analyzed in the MLP EA. Therefore, this analysis is limited to air quality impacts from transportation of FTF targets to and from Pearl Harbor.

4.15.1 Proposed Action

4.15.1.1 Air Quality

Transportation to Launch Site. Impacts on air quality from transportation of an FTF target to the sea launch staging location at Pearl Harbor could occur from air and ground transport of the target to Pearl Harbor and the MLP berth.

As described in Section 2.6, a maximum of one roundtrip target shipment per year to and from Pearl Harbor was assumed for purposes of analysis in this EA. One roundtrip shipment would increase the number of landings and takeoffs at Hickam AFB by up to a maximum of 16 extra flights per year. Exhibit 4-4 in the transportation analysis for Redstone Arsenal presents the total emissions from one landing/takeoff cycle for up to seven C-17 and one C-5 aircraft (i.e., one FTF target shipment).

Assuming that one FTF sea launch would be staged from Pearl Harbor each year, the maximum amount of annual emissions at Hickam AFB due to aircraft transport would be 0.087 metric tons (0.096 tons) of HC, 0.35 metric tons (0.38 tons) of CO, 0.44 metric tons (0.49 tons) of NO_X, and 0.016 metric tons (0.017 tons) of SO_2. Hickam AFB and Pearl Harbor are in attainment for all Federal NAAQS. Emissions in the area around Pearl Harbor are well below state and Federal AADC. The total emissions from air transport shipments of FTF targets to and from Hickam AFB would be below any Federal *de minimis* quantities for non-attainment areas, therefore the emissions from the additional flights to and from the AFB would not cause a significant impact on air quality.

Once at Hickam AFB, a maximum of 12 ground vehicles (including the CT and CE) per target shipment would travel approximately 8 kilometers (5 miles) one way over local roads to the sea launch staging location at the MLP berth at Pearl Harbor. Exhibit 4-22 presents the estimated emissions per mile for each truck during ground transportation.

Exhibit 4-22. Ground Transportation Emissions Pearl Harbor

Pollutant	Emissions in Grams per Mile[1]	Truck Emissions per Roundtrip, metric tons (tons)	Total Truck Emissions per year, metric tons (tons)
VOC	1.100	0.000011(0.000012)	0.00013 (0.00014)
CO	6.461	0.000065 (0.000072)	0.00078 (0.00086)
NO_X	15.434	0.00015 (0.00017)	0.0018 (0.002)
PM_{10}	0.316	0.0000032 (0.0000035)	0.00004 (0.000044)
SO_2	0.346	0.0000035 (0.0000039)	0.00004 (0.000044)

1 The emission factors were derived from the U.S. EPA mobile source emission factor model, MOBILE6.2, and assumed that the transport trucks would be no older than model year 2002 and all travel would be over local roads. Roundtrips were assumed to be 16 kilometers (10 miles).

The increased emissions from an additional 12 trucks one time per year traveling a maximum of 16 kilometers (10 miles) would be 0.00013 metric tons (0.00014 tons) of VOCs, 0.00078 metric tons (.0.00086 tons) of CO, 0.0018 metric tons (0.002 tons) of NO_X, 0.00004 metric tons (0.000044 tons of PM_{10}, and 0.00004 metric tons (0.000044 tons) of SO_2. The estimated emissions from trucks transporting the FTF target and its supporting equipment from the Hickam AFB to the staging location at Pearl Harbor would be significantly below the Federal *de minimis* levels for all pollutants. Therefore, air quality impacts from ground transportation emissions at Pearl Harbor and its receiving airport at Hickam AFB associated with the proposed action would be not significant.

Post-launch. No impacts on air quality are expected from post-launch staging activities.

4.15.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude the staging of LV-2 and SR19/SR73 at air-launch staging locations. Because Pear Harbor is a location proposed to support sea-based launches of FTF targets and would not serve as a staging location for air-based launches, potential environmental impacts on all resource areas from the launch of FTF targets from USAKA/RTS would be the same under alternative 1 as under the proposed action.

4.15.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. Staging activities involving SR19/SR73 would not occur from Pearl Harbor as proposed. MDA would continue to stage those target configurations from Pear Harbor with existing NEPA documentation. Under the no action alternative there would be no environmental impacts to any environmental resource areas at Pearl Harbor from the proposed action and existing planned launch activities would continue to occur.

4.16 Broad Ocean Area

Impacts from target launch into both the Atlantic and Pacific BOAs were considered in the BMDA PEIS. (MDA, 2007a) Impacts from FTF target launches would be identical to those discussed in the BMDS PEIS; therefore, this analysis is summarized below.

The BMDS PEIS concluded that winds from the BOA would disperse any ground level emissions. Pollutants would be present in the exhaust plume from boosters launched from sea platforms that could threaten wildlife near the point of sea launch. However, these pollutants would be produced in trace quantities and would not have measurable effects on biological resources. Boosters hitting the ocean surface would impart a considerable amount of kinetic energy to the ocean water upon impact. However, injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 [6 in 10,000] marine mammals exposed per year). Impacts on marine biological resources from releases of residual propellants from liquid propellant boosters would not be significant. The natural buffering capacity of sea water and the strong ocean currents would neutralize the reaction to any release of the liquid propellants.

No impacts on geology and soils would be expected from debris falling into the ocean due to the depth of the ocean where debris would impact. To address hazardous materials and waste, NASA conducted evaluations of the effects of missile systems deposited in sea waters. The studies determined that materials would be rapidly diluted, and except for areas in the immediate vicinity of the debris, would not be found at concentrations identified as causing any adverse effects. Therefore, no significant impacts to the ocean environment would be expected from post-launch activities involving liquid propellant targets.

During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In salt water, it would likely take over one year for the perchlorate contained in solid propellant to leach out into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations.

Booster trajectories would be established to preclude potential water impacts in heavily trafficked ocean areas. NOTMARs would be issued as appropriate to advise mariners of the projected impact area. In the event of a flight termination, the possibility of debris impacting a sea vessel would be remote, and therefore safety impacts associated with flight termination would not be significant.

There would be no significant impacts to the BOA from noise related to target launch. Debris from targets may fall into waters normally occupied by commercial shipping. Prior warning of proposed launch activities through issuances of NOTMARs would enable commercial shipping to follow alternative routes away from the proposed debris impact area. Therefore, no impacts on transportation would be expected.

As discussed in the BMDS PEIS and summarized above, there would be no significant impacts on the BOA from the launch of FTF targets.

4.17 Atmosphere

Impacts of missile launches to the upper atmosphere have been previously analyzed in the BMDS PEIS (MDA, 2007a), and impacts from launches of Peacekeeper-type rockets were analyzed in the Final EA for the Orbital/Sub-Orbital Program (U.S. Air Force, 2006). Because the Peacekeeper-type rockets have larger propellant amounts in their second and third stages than do the largest of the proposed FTF targets, impacts to the upper atmosphere from launches of FTF targets are expected to be similar to or less than impacts described in the Orbital/Sub-Orbital Program EA. The impacts described in that document are summarized below.

Atomic chlorine produced from emissions of HCl during high-temperature "afterburning" reactions in the exhaust plume of solid propellant rocket motors can contribute to overall global chlorine loading, which contributes to long-term ozone depletion. Stratospheric HCl is diffused through the troposphere and dissipates with a half-life of about 2.3 years; however, HCl from rocket emissions could have longer lifetimes because part of the emission occurs at atmospheric levels above the stratosphere. Studies have shown that Al_2O_3, which is emitted from the rocket exhaust as solid particles, could contribute to ozone depletion via activation of chlorine in the atmosphere. However, emissions of HCl and Al_2O_3 from launches of Peacekeeper-type missiles would be less than those released by a single Space Shuttle launch, and on a global scale the level of emissions would not be statistically significant. Emissions of NO_X produced in the exhaust plume of rockets can also contribute to stratospheric ozone depletion. However, on a global scale, this represents a very small fraction of NO_X species generated and, thus would not have a significant effect on ozone levels. Because the emissions of HCl, Al_2O_3, and NO_X from launches of Peacekeeper-sized missiles would be relatively small compared to emissions released on a global scale, the large air volume over which these emissions are spread, and the rapid dispersion of the emissions by stratospheric winds, launches of Peacekeeper-type missiles should not have a significant impacts on stratospheric ozone. Therefore, because the largest FTF target is smaller than and would have similar to or fewer emissions, impacts from launches of FTF targets would not be expected to have a significant impact on the upper atmosphere.

Impacts of target launches on global warming and ozone depletion in the atmosphere have been considered as part of cumulative impacts in Section 4.18.

4.18 Cumulative Impacts

This section presents cumulative impacts associated with the proposed action and alternatives. Cumulative impacts include the consideration of the incremental effects of an action when considering past, present, and reasonably foreseeable future actions, regardless of the agencies or parties involved. Cumulative effects can result from individually minor, but collectively potentially significant, impacts occurring over the duration of the proposed action and within the same geographical area. The proposed action addressed in this EA considers the transportation and use (including pre-launch, launch and post-launch activities) of a maximum of 20 FTF targets from worldwide land, sea, and air-based platforms annually.

4.18.1 Proposed Action

MDA considered the cumulative impacts of the transportation of FTF targets by ground from the target integration facilities in Alabama to Redstone Arsenal, transportation by air from the Redstone Arsenal Army Airfield to the launch and staging locations, and the pre-launch, launch, and post-launch FTF target activities that would occur at specific land launch locations that already support MDA target launches and staging locations on existing air bases worldwide.

Under the proposed action, it was conservatively estimated that up to 20 roundtrip target shipments would originate from either the Courtland Target Facility in Lawrence County, Alabama (for solid propellant targets) or from the Lockheed Martin Target Missile Systems facility (for liquid propellant targets) and travel by ground to Redstone Arsenal in Huntsville, Madison County, Alabama. Those 20 roundtrip target shipments would add up to a maximum of 240 truck roundtrips over 63 kilometers (43 miles) per year and would increase the number of landings and takeoffs into and out of Redstone Arsenal Army Airfield by up to a maximum of 320 extra flights per year. As described in Chapter 4, the total emissions from those additional truck roundtrips and flights would not create significant impacts on air quality. The additional truck trips would fall within the normal transportation capacity of the roads to Redstone Arsenal. The additional flights would increase the current operations tempo at Redstone Army Airfield by only 1.4% over current operating conditions. This would not be considered a significant increase in ground or air operations. Therefore, there would be no cumulative impacts from the transportation of up to 20 FTF targets per year from the FTF target integration facilities to Redstone Arsenal and then on to the launch or staging locations.

Four of the land launch sites included site preparation and construction as part of the pre-launch activities – KLC, Vandenberg AFB, USAKA/RTS (Meck Island), and Wake Island. The remaining land launch sites, PMRF, WSMR, and Fort Wingate, had no site preparation or construction requirements. The cumulative impacts of the transport, pre-launch, launch and post-launch activities using FTF targets at all land launch locations were found to be not significant as discussed for each land launch site below.

KLC. Under the proposed action there would be a maximum of two FTF targets transported to and launched from KLC annually. The following bullets discuss site-specific impacts at KLC from transportation, pre-launch, launch and post-launch FTF target activities.

- *Transportation*: Two FTF target shipments would increase the number of landings and takeoffs at Kodiak Airport by up to a maximum 32 additional flights and would add up to 24 truck roundtrips over 71 kilometers (44 miles) from the airport to KLC per year. As described in Chapter 4, those flights and truck roundtrips would not create significant impacts on regional air quality. Therefore, there would be no cumulative impacts from the transportation of FTF targets to KLC.

- *Pre-launch*: Site preparation and construction activities would disturb approximately 0.011 hectare (0.027 acre) of soil and cause a slight increase in some air pollutants at KLC. However, the impact would be temporary and localized and would not be significant. Once construction ceased, air quality would return to its former level. Pre-launch pad setup activities would have no significant impacts on resources areas at KLC. Therefore, there would be no cumulative impacts expected at KLC from pre-launch activities.

- *Launch*: KLC is an FAA-licensed commercial launch site authorized for up to nine launches per year. The KLC EA analyzed cumulative impacts of nine annual launches and predicted that no significant impacts on air quality, airspace, biological resources, cultural resources, geology and soils, hazardous materials and waste, health and safety, land use, noise, socioeconomics and environmental justice, transportation, visual resources, or water resources would result. (FAA, 1996) The two proposed FTF target launches would fall within the impacts considered for the nine total annual launches approved by the FAA in the AADC launch site operator license because the FTF targets would replace existing targets in the BMDS testing program. The FTF target launches would have fewer impacts than those assessed for the largest vehicle previously launched from KLC, and therefore, there would be no cumulative impacts from the FTF target launches at KLC.

- *Post-launch*: Post-launch activities would have no significant impacts on resource areas at KLC. Therefore, there would be no cumulative impacts expected from these activities.

Vandenberg AFB. Under the proposed action there would be a maximum of four FTF targets transported to and launched from Vandenberg AFB per year as discussed below.

- *Transportation*: Four FTF target shipments would increase the number of landings and takeoffs at Vandenberg by up to a maximum of 64 additional flights and would add up to 48 truck roundtrips over 22.5 kilometers (14 miles) from the on-site airport to the launch locations per year. As described in Section 4, those flights and truck roundtrips would not create significant impacts on air quality. Therefore, there would be no cumulative impacts from the transportation of FTF targets to Vandenberg.

- *Pre-launch:* Site preparation and construction activities would result in a disturbance of approximately 0.35 hectare (0.86 acre) of soil and cause a slight increase in some air pollutants at Vandenberg AFB. However, the impact would be temporary and localized and would not be significant. Once construction ceased, air quality would return to its former level. Pre-launch pad setup activities would have no significant impacts on resource areas at Vandenberg AFB. Therefore, there would be no cumulative impacts at Vandenberg AFB from FTF target pre-launch activities.

- *Launch:* MDA has projected up to 11 BMDS program launches for Fiscal Year 2007 and nine launches for FY08 from Vandenberg AFB. (U.S. Department of the Air Force, 2006a) The NEPA analyses for these launches found that cumulative impacts on all resource areas would not be significant because rocket launches are short-term, discrete events that would occur at widely-spaced times and locations on the base. Launches would be spaced far enough apart so that winds would quickly and effectively disperse any launch-related emissions between launches. In addition, the proposed FTF targets would generate fewer emissions than larger rockets that have been analyzed and launched from the base (e.g., Peacekeeper). The four FTF target launches would be included in the total annual BMDS launches because FTF targets would replace existing targets in the BMDS testing program; therefore, there would be no cumulative impacts at Vandenberg AFB from the proposed FTF target launches.

- *Post-launch:* Post-launch activities would have no significant impacts on resources areas at Vandenberg AFB. Therefore, there would be no cumulative impacts expected from these activities.

USAKA/RTS (Meck Island). Under the proposed action there would be a maximum of one FTF target transported to and launched from Meck Island at USAKA/RTS per year as discussed below.

- *Transportation*: One FTF target shipment would increase the number of landings and takeoffs at USAKA/RTS's on-site airport by up to a maximum of 16 additional flights, and would add up to 12 truck roundtrips over less than 8 kilometers (5 miles) from the on-site airport to the launch location per year. As described in Section 4, those flights and truck roundtrips would not create significant impacts on regional air quality. Therefore, there would be no cumulative impacts from the transportation of FTF targets to Meck Island.

- *Pre-launch*: Site preparation and construction activities on Meck Island would result in a disturbance of approximately 0.03 hectare (0.08 acre) of soil and cause a slight increase in some air pollutants. However, the impact would be both temporary and localized and would not be significant. Once construction ceased, air quality would return to its former level. Pre-launch pad setup activities would have no significant impacts on resource areas at USAKA/RTS. Therefore, there would be no cumulative impacts from FTF target pre-launch activities on Meck Island.

- *Launch*: Rocket launches are short-term, discrete events that would occur at widely-spaced times at USAKA/RTS. Because of this, the effects of individual launches would not be additive, but rather, impacts would be equivalent to any one launch. The single proposed FTF launch from Meck Island would not increase the overall number of launches at USAKA/RTS because FTF targets would replace existing targets for the BMDS testing program, and would pose impacts that are similar to or less than larger missiles that have been launched from the test site. Therefore, there would be no significant cumulative impacts on any resource area from the launch of one FTF target per year from Meck Island, USAKA/RTS.

- *Post-launch*: Post-launch activities would have no significant impacts on resource areas at USAKA/RTS. Therefore, there would be no cumulative impacts expected from these activities.

Wake Island. Under the proposed action there would be a maximum of two FTF targets transported to and launched from Wake Island per year as discussed below.

- *Transportation*: Two FTF target shipments would increase the number of landings and takeoffs at Wake Island's on-site airport by up to a maximum of 32 additional flights, and would add up to 24 truck roundtrips over less than 5 kilometers (3 miles) from the on-site airport to the launch location per year. As described in Section 4, those flights and truck roundtrips would not create significant impacts on air quality. Therefore, there would be no cumulative impacts from the transportation of FTF targets to Wake Island.

- *Pre-launch*: All site preparation and construction activities proposed for Wake Island would be on impervious concrete, therefore, no ground disturbing activities would occur under the proposed action. However, construction equipment and vehicles would still be used to prepare the launch site for FTF launches and would cause a slight increase in some air pollutants while in use. However, the impacts would be both temporary and localized and would not be significant. Once construction ceased, air quality would return to its former level. Pre-launch pad setup activities would have no significant impacts on resource areas at Wake Island. Therefore, there would be no cumulative impacts expected at Wake Island from pre-launch activities.

- *Launch*: Rocket launches are short-term, discrete events that would occur at widely-spaced times at Wake Island. Because of this, the effects of individual launches would not be additive, but rather, impacts would be equivalent to any one launch. The two proposed FTF launches from Wake Island would not increase the overall number launches at Wake Island as FTF targets would replace other targets in the BMDS test program, and would pose impacts that are similar to or less than larger missiles that have been launched from the Island. Therefore, no significant cumulative impacts to any resource area are expected from launches of two FTF targets from Wake Island annually.

- *Post-launch*: Post-launch activities would have no significant impacts on the affected environment at Wake Island. Therefore, there would be no cumulative impacts expected from these activities.

PMRF. Under the proposed action there would be a maximum of seven FTF targets transported to and launched from PMRF per year as discussed below.

- *Transportation*: Seven FTF target shipments would increase the number of landings and takeoffs at PMRF's on-site airport by up to a maximum of 112 additional flights, and would add up to 84 truck roundtrips over 3.2 kilometers (2 miles) from PMRF's airport to the launch site per year. As described in Chapter 4, those flights and truck roundtrips would not create significant impacts on air quality. Therefore, there would be no cumulative impacts from the transportation of FTF targets to PMRF.

- *Pre-launch*: Pre-launch pad setup activities would have no significant impacts on the affected environment at PMRF. Therefore, there would be no cumulative impacts expected from these activities.

- *Launch*: Rocket launches are short-term, discrete events that would occur at widely-spaced times at PMRF. Because of this, the effects of individual launches would not be additive, but rather, impacts would be equivalent to any one launch. The proposed FTF launches would not increase the overall number launches at PMRF because FTF targets would replace existing targets in the BMDS testing program, and impacts would be similar to or less than those associated with larger missiles that have been launched from the facility. Therefore, no significant cumulative impacts to any resource area at PMRF are expected from launches of FTF targets.

- *Post-launch*: Post-launch activities would have no significant impacts on the affected environment at PMRF. Therefore, there would be no cumulative impacts expected from these activities.

WSMR. Under the proposed action there would be a maximum of three FTF targets transported to and launched from WSMR per year as discussed below.

- *Transportation*: Three roundtrip shipments would increase the number of landings and takeoffs at Holloman AFB by up to a maximum of 48 flights, and would add up to 36 truck roundtrips over 32 kilometers (20 miles) from Holloman AFB to the launch site at WSMR per year. As described in Section 4, those flights and truck roundtrips would not create significant impacts on air quality. Therefore there would be no cumulative impacts from the transportation of FTF targets to WSMR.

- *Pre-launch*: Pre-launch pad setup activities would have no significant impacts on resource areas at WSMR. Therefore, there would be no cumulative impacts expected from these activities.

- *Launch*: Rocket launches represent short-term, discrete events that would occur at widely-spaced times at WSMR. Because of this, the effects of individual launches would not be additive, but rather, impacts would be equivalent to any one launch. The three proposed FTF launches from WSMR would not increase the overall number of launches at WSMR because FTF target would replace existing targets in the BMDS testing program and would pose impacts that are similar to or less than larger missiles that have been launched from the range. Therefore, no significant cumulative impacts on any resource area at WSMR would be expected from three FTF target launches per year.

- *Post-launch*: Post-launch activities would have no significant impacts on resource areas at WSMR. Therefore, there would be no cumulative impacts expected from these activities.

Fort Wingate. Under the proposed action there would be a maximum of one FTF target transported to and launched from Fort Wingate per year.

- *Transportation*: One FTF target shipment would increase the number of landings and takeoffs at Kirtland AFB by up to a maximum of 16 extra flights, and would add up to 12 truck roundtrips over 120 kilometers (75 miles) from Kirtland AFB to the launch site at Fort Wingate per year. As described in Chapter 4, those flights and truck roundtrips would not create significant impacts on air quality. Therefore, there would be no cumulative impacts from the transport of one FTF target per year to Fort Wingate.

- *Pre-launch*: Pre-launch pad setup activities would have no significant impacts on resource areas at Fort Wingate. Therefore, there would be no cumulative impacts expected from these activities.

- *Launch*: Rocket launches are short-term, discrete events that would occur at widely-spaced times at Fort Wingate. Because of this, the effects of individual launches would not be additive, but rather, impacts would be equivalent to any one launch. The one proposed FTF launch from Fort Wingate would not increase the overall number of launches at Fort Wingate, and would pose impacts that are similar to or less than larger missiles that have been launched from the facility. Therefore, no significant cumulative impacts on any resource area would occur at Fort Wingate from the launch of one FTF target per year.

- *Post-launch*: Post-launch activities would have no significant impacts on resource areas at Fort Wingate. Therefore, there would be no cumulative impacts expected from these activities.

Staging Locations. MDA also considered the cumulative impacts of the transport and staging of FTF targets at various locations worldwide to accommodate air- and sea-launch target requirements. These staging locations are: YPG, Arizona; Elmendorf AFB, Alaska; Hill AFB, Utah; Misawa AB, Japan; and Pearl Harbor, Hawaii. All proposed staging locations are operational military bases and routinely carry out such activities. The addition of one FTF target transported to and staged from these locations annually was determined to be not significant. The transportation of FTF targets would use existing infrastructure (ships, aircraft, and trucks) that would use existing transportation corridors (shipping lanes, air routes, and highways). The additional transportation impacts from up to 16 flights to and from each of the staging locations would not result in significant impacts on air quality at any of the staging locations. Therefore, the transportation and staging of FTF targets would not result in any significant cumulative impacts at any of the staging locations.

Broad Ocean Area. The proposed action would have no significant cumulative effects on the BOA which would be the major receptor for either the intact target or debris and jettisoned expended rocket motors. Target launches are short-term, discrete events that would occur at different times of the year, and FTF target launches would not result in increased launch events as the targets replace the existing target inventory in the BMDS testing program.

Boosters hitting the ocean surface would impart a considerable amount of kinetic energy to the ocean water upon impact. For example, boosters would hit the water with speeds of 91 to 914 meters (300 to 3,000 feet) per second. The shock wave from their impact with the water would be similar to that produced by explosives. Depending on the water depth, strong waves from the impact may detach kelp strands from the sea floor.

Boosters would impact in the deep open ocean waters. At close ranges, injuries to marine mammal internal organs and tissues would likely result. However, the density of marine species including marine mammals generally decreases, and the corresponding probability of impact decreases, as the distance from the shore increases. Injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 (6 in 10,000) marine mammals exposed per year). (MDA, 2007a)

Impacts to marine biological resources from releases of residual propellants from liquid propellant boosters would not be significant. The natural buffering capacity of sea water and the strong ocean currents would neutralize the reaction to any release of the liquid propellants.

The solid rocket motor debris and propellant from a destroyed or exploded rocket motor that fall into the ocean would most likely sink to the ocean floor at depths of thousands of meters. At such depths, the propellant parts would be located away from feeding marine mammals. (MDA, 2007a) Therefore, marine animals would not be impacted from ingesting the solid propellant.

Upper Atmosphere. These activities involving FTF targets would support the MDA's BMDS test and development program as addressed in the BMDS PEIS. The FTF targets considered in this EA would replace targets in projected future test launch activities and therefore MDA assumes no additional launches beyond the 515 launches during a 10-year period already evaluated in the BMDS PEIS[11]. This analysis determined that cumulative impacts of worldwide launches from various land, sea and air-launch platforms were expected to be less than significant on global warming and ozone depletion as discussed below. (MDA, 2007a)

Global Warming. Potential launch emissions that could affect global warming include CO and CO_2. Unlike CO_2, CO is not a greenhouse gas; however, it can contribute indirectly to the greenhouse gas effect and is therefore included in this analysis. The cumulative impact on global warming from launches would be insignificant compared to other industrial sources (e.g., energy generation using fossil fuel) and activities (e.g., deforestation and land clearing). Estimated BMDS launch emissions load of CO and CO_2 to the troposphere and stratosphere would account for only five percent of the emissions load from launches worldwide. However, even when accounting for both BMDS launches and other launches worldwide, the CO and CO_2 load would be extremely small compared to emissions loads from other industrial sources just in the U.S. As Exhibit 4-23 indicates, the amount of CO and CO_2 emissions load from all launches over the 10-

[11]The number of projected launches for the ballistic missile defense system was estimated at 515 launches during a ten-year period. Worldwide projected launches, which include 77 U.S. commercial launches; 99 U.S. government launches; 183 foreign commercial launches; and 476 foreign government launches, were estimated to total 835 launches during the years 2004 through 2014. (MDA, 2007)

year period under consideration would account for 3.5 x 10^{-4} percent of CO and CO_2 emissions load from U.S. industrial sources in one year.

Exhibit 4-23. Comparison of Emission Loads of CO and CO2 to Troposphere and Stratosphere

Emission Sources	CO and CO_2 Emissions in metric tons (tons)
BMDS Projected Launches, 2004-2014	6,235 (6,871)
Worldwide Projected Launches, 2004-2014	114,573 (126,260)
Other Industrial Sources in the U.S., 2004-2014	34 billion (37.6 billion) for one year 136.3 billion (150.2 billion) for four years

Source: MDA, 2007a

Ozone Depletion. Ozone depletion is a major concern, as the stratospheric ozone layer protects the Earth from adverse levels of ultraviolet radiation. Chlorine is a chemical of primary concern with respect to ozone depletion. Launches are one of the human-made sources of chlorine in the stratosphere. The cumulative impact on stratospheric ozone depletion from launches would be far below and indistinguishable from the effects caused by other natural and man-made causes. Projected BMDS launches would include boosters considerably smaller than those used on the Space Shuttle; therefore, the air quality impacts from the Space Shuttle provide a conservative upper bound for comparison. As Exhibit 4-24 indicates, the emission loads of chlorine (as HCl and free chlorine [Cl]) from both BMDS and other launches worldwide as projected from 2004-2014 would account for only 0.5 percent of the industrial Cl load from the U.S. over the 10-year period. The majority of the chlorine load from launches is as HCl, which does not readily break down into the ozone-depleting substance Cl. Also, the HCl in the troposphere is usually quickly removed by water in the atmosphere. The emissions load of chlorine from launch activities would also be minimal in comparison to the 362,874 metric tons (400,000 tons) of inorganic chlorine created annually by photolysis of historical reservoirs of CFCs. (MDA, 2007a)

Exhibit 4-24. Comparison of Emission Loads of Chlorine (HCl and Free Cl) in Troposphere and Stratosphere

Emission Source	Cl Emissions in metric tons (tons)
Projected BMDS Launches, 2004-2014	2,724 (3,002)
Projected Worldwide Launches, 2004-2014	13,226 (14,580)
Other Industrial Sources in the U.S, 2004-2014	2,993,694 (3,000,000)

Source: MDA, 2007a

Almost all of the studies to date on ozone depletion from launches are based upon homogenous gas phase chemistry, which does not address the effects from particulates and aerosols released during ascent. There are no commonly accepted models that accurately predict the effects from particulates and aerosols on ozone depletion caused by launches. Future analysis of launches using heterogeneous chemistry could significantly alter the understanding of cumulative impacts of launch emissions on stratospheric ozone depletion. There is some evidence that particulates may play a larger role in ozone depletion reactions than has currently been demonstrated. If this were the case, assuming only homogeneous gas phase chemistry (i.e., no effects from particulates or aerosols), the amount of ozone depletion actually occurring as a result of emissions from launches would be underestimated.

4.18.2 Alternative 1

Under alternative 1, the LV-2 and SR19/SR73 targets would not be launched from air-based platforms. The activities associated with alternative 1 would be identical to those associated with the proposed action for land- and sea-based launches but would exclude staging of LV-2 and SR19/SR73 at air-launch staging locations. Because the overall number of FTF target launches would not change, the potential cumulative environmental impacts on all resources from alternative 1 would be identical to those identified for the proposed action.

4.18.3 No Action Alternative

Under the no action alternative, no new target configurations would be launched to support BMDS testing. The transportation, pre-launch, launch, and post-launch activities involving SR19/SR73, LV-2, and LV-3 would not occur as proposed. MDA would continue to launch those target configurations with existing NEPA documentation. Under the no action alternative there would be no environmental impacts on any environmental resource areas from the proposed action and existing planned launch activities would continue to occur.

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