ADVANCED HYPERSONIC WEAPON FLIGHT TEST 2

HYPERSONIC TECHNOLOGY TEST

ENVIRONMENTAL ASSESSMENT

July 2014

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
05/15/2014	Final	May 2013 - May 2014

4. TITLE AND SUBTITLE
ADVANCED HYPERSONIC WEAPON FLIGHT TEST 2
HYPERSONIC TECHNOLOGY TEST
ENVIRONMENTAL ASSESSMENT
MAY 2014

5a. CONTRACT NUMBER
W9113M-11-D-0004

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Hubbs, Mark

5d. PROJECT NUMBER

5e. TASK NUMBER
0006

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Space and Missile Defense Command/Army Strategic Forces Command (USASMDC/ARSTRAT)
PO Box 1500
Huntsville, AL 35807-3801

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
USASMDC/ARSTRAT
ATTN: SMDC-EN-V (Mr. Mark Hubbs)
PO Box 1500
Huntsville, AL 35807-3801

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT
This Environmental Assessment document the potential environmental impacts of conducting a demonstration flight test of the Advanced Hypersonic Weapon. The flight test vehicle would be launched from the Kodiak Launch Complex, using an existing three-stage Strategic Target System. Following booster separation, the test vehicle would glide to an impact site in the vicinity of Illeginni Islet at the U.S. Army Garrison, Kwajalein Atoll in the Republic of the Marshall Islands.

15. SUBJECT TERMS
Environmental Assessment, Finding of No Significant Impact, NEPA, Strategic Target System, Advanced Hypersonic Weapon, Kodiak Launch Complex, Kwajalein Atoll, Illeginni Islet, Republic of the Marshall Islands

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Mr. Mark Hubbs
					19b. TELEPHONE NUMBER *(Include area code)*
U	U	U	SAR		(256) 955-2608

Standard Form 298 (Rev. 8/98)
Prescribed by ANSI Std. Z39.18

ADVANCED HYPERSONIC WEAPON FLIGHT TEST 2 HYPERSONIC TECHNOLOGY TEST ENVIRONMENTAL ASSESSMENT

AGENCY: U.S. Army Space and Missile Defense Command / Army Forces Strategic Command (USASMDC/ARSTRAT)

ACTION: Finding of No Significant Impact

BACKGROUND: Over the past few years, Department of Defense reviews and studies have supported a Conventional Prompt Global Strike capability that provides the President with the ability to promptly engage targets at strategic range without using nuclear weapons. Recent design progress enabled conceptual technology demonstrations using Hypersonic Glide Body (HGB) vehicles. Advances in several key technologies are needed to achieve prompt global reach effects on targets with precision.

The purpose of the proposed Advanced Hypersonic Weapon Flight Test 2 Hypersonic Technology Test (AHW FT2 HTT) demonstration is to collect data related to hypersonic flight techniques to share with collaborating Department of Defense agencies. The AHW FT2 HTT is needed to test the maturity of several key technologies and concepts in the unique environments of hypersonic flight that cannot be fully replicated in ground-based testing facilities.

Pursuant to the Council on Environmental Quality regulations for implementing the procedural provisions of the National Environmental Policy Act (40 Code of Federal Regulations [CFR]); 32 CFR Part 651, Environmental Analysis of Army Actions (Army Regulation 200-2); 32 CFR § 775, Department of the Navy Procedures for Implementing the National Environmental Policy Act; and Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, the U.S. Army has prepared an Environmental Assessment (EA) to evaluate and disclose environmental consequences associated with the proposed AHW FT2 HTT demonstration.

DESCRIPTION OF THE PROPOSED ACTION: The AHW FT2 HTT demonstration would involve a vehicle launch from the Kodiak Launch Complex (KLC) in Alaska using an existing Strategic Target System (STARS) booster with three stages. The AHW FT2 HTT vehicle would be included as payload on the STARS booster. After down range booster separation, the vehicle would glide at hypersonic velocities in the upper atmosphere, prior to a land or ocean impact at the U.S. Army Garrison Kwajalein Atoll/Reagan Test Site (USAGKA/RTS) (on or near Illeginni Islet) in the Republic of the Marshall Islands (RMI).

The mission planning process would consider avoiding all potential risks to environmentally significant areas. The AHW FT2 HTT is planned to impact in the vicinity of Illeginni Island, with three possible impact zone scenarios. Two of these scenarios would involve deep open ocean impact, while the third (the Preferred Alternative) would involve a land impact on the northwest end of Illeginni as limited by available land mass. It would be located west of the tree line to avoid affecting the bird habitat. One water impact zone is in the deep water region southwest of Illeginni Islet. The second ocean impact zone would be in the broad ocean area (BOA) northeast of Kwajalein Atoll; the HGB would impact in this location if the flight test expends more energy earlier than planned. All impact zones would be sized based on Range Safety requirements and chosen as part of the mission analysis process. Range Safety issues would also be part of selecting the impact zone scenario. Vehicle impacts from other tests have occurred within the Kwajalein Atoll lagoon, on and in the vicinity of Illeginni Island, and in the BOA near USAGKA/RTS.

The AHW FT2 HTT demonstration is tentatively scheduled for 2014 from the KLC in Alaska. This program test has been certified compliant with the Strategic Arms Reduction Treaty I and the Intermediate-Range Nuclear Forces Treaty. The Department of Defense Compliance Review Group has determined that the proposed mission is consistent with U.S. obligations under the Intermediate-Range Nuclear Forces and the new Strategic Arms Reduction Treaty. The flight test is designed to travel approximately 3,500 miles, with an instrumentation package designed to gather data to validate AHW design assumptions and environmental models.

NO-ACTION ALTERNATIVE: Under the No-action Alternative, USASMDC/ARSTRAT would not pursue the AHW FT2 HTT demonstration. There would be no USASMDC/ARSTRAT role in the Office of the Secretary of Defense Conventional Prompt Global Strike technology development and demonstration activity. Existing programs at the KLC, USAGKA/RTS, and others in the region would continue.

ENVIRONMENTAL EFFECTS: Twelve broad areas of environmental consideration were originally considered to provide a context for understanding the potential effects of the Proposed Action and to provide a basis for assessing the severity of potential impacts.

These areas included air quality, airspace, biological resources, cultural resources, geology and soils, hazardous materials and waste, health and safety, infrastructure, land use, noise, socioeconomics, and water resources. This EA also addresses Environmental Justice concerns. All twelve areas were analyzed for the proposed location and activity. The geology and soils, infrastructure, land use, and socioeconomics are not subjected to detailed analysis due to clearly insignificant

impacts from the Proposed Action. The remaining areas of environmental consideration include analysis of the alternatives, affected environmental, direct and indirect impacts as well as any program actions or mitigation measures necessary to minimize impacts to the environment.

Air Quality:

Kodiak Launch Complex. The potential for air quality effects related to current launching activities at the KLC has been evaluated extensively in previous studies. Permanent air quality effects due to rocket launches have not been observed during 16 previous rocket launches at the KLC. The proposed AHW FT2 HTT launch vehicle, STARS IV, is very similar to the STARS III vehicle used in previous launches and is anticipated to have demonstrably comparable air quality impacts. Although the launch produces obvious exhausts, studies show that these emissions do not produce short-term exceedences of either the National Ambient Air Quality Standards or health-based guidance levels in areas accessible to the general public. No long term effects are anticipated.

Broad Ocean Area. The limited amount of rocket emissions from the Proposed Action would not have a significant impact on stratospheric ozone depletion; any emission of ozone-depleting gases represents a minute increase that could have incremental effects on the global atmosphere. The greenhouse gas emissions associated with the Proposed Action fall well below the Council on Environmental Quality significance threshold.

Airspace:

Kodiak Launch Complex. KLC coordinates launches with airspace users through the existing airspace coordination protocol among KLC, commercial aircraft carriers, and military aircraft. Airspace above KLC up to 18,000 feet altitude is uncontrolled airspace. Airspace above 18,000 feet is controlled airspace. The Anchorage Air Route Traffic Control Center and the Kodiak Air Traffic Control Tower regulate air traffic in the vicinity of KLC. Launches from KLC do not affect military training exercises. Commercial and private aircraft operating in the area would be notified in advance of launch activities through Notices to Airmen (NOTAMs) by the Federal Aviation Administration (FAA). Due to the coordination and planning procedures that are in place, the proposed activities do not conflict with any airspace use plans, policies, and controls.

U.S. Army Garrison Kwajalein Atoll/Reagan Test Site. Illeginni is located under international airspace and, therefore, has no formal airspace restrictions governing it. No new special use airspace would be required. Commercial and private aircraft would be notified in advance of the AHW FT2 HTT launch by USAGKA/RTS as part of routine

operations through NOTAMs by the FAA. The responsible commander would coordinate with the Administrator, FAA, through the appropriate U.S. Army airspace representative. Operations at the USAGKA airfields would not be obstructed.

Biological Resources:

Kodiak Launch Complex. Compliance with relevant policies and procedures effectively limits the potential for introduction of invasive species by material and equipment transportation to the launch facility. No threatened or endangered vegetation is located within the launch site boundary or in the offshore area, and thus no adverse effects are anticipated. Also, there is no identified essential fish habitat that would be affected.

The combination of increased noise levels and human activity (personnel, vehicles, helicopters, and landing craft) would likely displace some birds and small mammals (e.g., common field and urban birds and mice) that forage, feed, or nest within and adjacent to the launch site. This noise immediately before the launch would tend to cause birds and other mobile species of wildlife to temporarily leave the area that would be subject to the highest level of launch noise. Foraging water birds would be subjected to increased energy demands if flushed by the noise, but this should be a short-term, minimal impact.

Threatened and endangered marine mammals and bird species would not be affected since no site preparation activities would take place offshore. Because the test activity is of short duration, bird migration patterns would not be altered. Pinniped haul-outs associated with nearby Ugak Island are an important and environmentally sensitive habitat proximate to the KLC. Site preparation activities would not affect this area of critical habitat. Impacts on mammal and bird species behavior from the launch are expected to be temporary, as observed during other launches.

U.S. Army Garrison Kwajalein Atoll/Reagan Test Site. The activities would incorporate procedures to avoid threatened or endangered wildlife that are foraging, resting, or hauled out, such as threatened green turtles. To minimize the potential for impacts to migratory birds, scare techniques such as the use of visual deterrents (e.g., scarecrows and strobe lights) would be implemented to discourage birds from nesting in the intended impact area. No direct impacts to the bird habitat located on the southeastern part of the islet are anticipated.

Broad Ocean Area. As a precaution to minimize potential impacts on marine mammals and sea turtles, USAGKA/RTS personnel would conduct a helicopter or fixed-wing aircraft overflight of the Illeginni Islet vicinity at least three times over the week prior to the flight test. The final overflight would be made as close to the proposed test launch time as safely practicable. If personnel observe marine mammals or sea turtles in the

vicinity, they would report such findings to the USAGKA Environmental Management Office, the RTS Range Directorate, and the Flight Test Operations Director at KLC. Based on prior consultations, the National Marine Fisheries Service determined that underwater impacts are discountable because there are infrequent test events and because of the expected low density of listed species within the BOA. Similar findings for other marine mammal species are expected. Because there is only one flight test, a limited area of effects, the implementation of precautionary measures during pre-test preparations, and low animal-densities in the BOA, impacts to protected marine species from the AHW FT2 HTT are also expected to be discountable.

Cultural Resources:

Kodiak Launch Complex. No affected cultural resources are identified at the launch facility.

U.S. Army Garrison Kwajalein Atoll/Reagan Test Site. Buildings and other facilities at Illeginni are primarily in the central and eastern portions of the islet. The projected land impact location of the AHW FT2 HTT is on the northwest end of Illeginni. All of the known cultural sites on Illeginni have been classified as insignificant under the RMI Land Modification Regulations. No impacts are anticipated from a nominal launch. Personnel involved in launch and other operational activities would follow USAGKA Environmental Standards (UES) requirements in handling or avoiding any cultural resources uncovered during operational or monitoring activities.

Hazardous Materials and Waste:

Kodiak Launch Complex. The KLC has well established procedures and facilities for handling, storing, managing, and transporting hazardous substances, as well as resources for responding to spills, fires, and other hazardous conditions that could result from the proposed action. Proposed activities would use small quantities of hazardous materials that could result in the generation of some hazardous waste. The hazardous materials that are expected to be used are common products and may include diesel fuel, anti-freeze, hydraulic fluid, and lubricating oils. The solid propellants associated with the proposed action would be similar to past missile systems launched from KLC, and would follow the same hazardous materials and hazardous waste handling procedures developed under existing plans described in the affected environment.

U.S. Army Garrison Kwajalein Atoll/Reagan Test Site. Specific restoration actions and debris recovery, if necessary, would be determined on a case-by-case basis in coordination with the UES. At the conclusion of launch activities, USAGKA/RTS and mission personnel would remove recoverable debris from Illeginni Islet and backfill any

craters. Any hazardous waste remaining would be used or disposed of in accordance with the UES.

Health and Safety:

Kodiak Launch Complex. Activities required for the AHW FT2 HTT demonstration would comply with the KLC range standard operating procedures and launch-specific safety plans. Launch preparation activities are routinely accomplished at the facility and should not result in impacts related to health and safety to workers. Applicable State and Federal regulations and range safety plans and procedures are followed in transporting and handling potentially explosive ordnance and hazardous materials. Rocket components, including any propellant, are transported in Department of Transportation and military designed and approved shipping containers.

An explosive safety-quantity distance surrounding the transportation route and launch pad is cleared to protect personnel and would contain all potentially hazardous debris resulting from an accident on the launcher. The ground hazard area includes the area that may be at risk from a vehicle failure very early in flight typically extending 1,000 to 20,000 feet from the launch point, depending on the vehicle and mission. The ground hazard area for the launch is a modified 10,000 feet from the launch location. Clearance of this region ensures that the public is excluded from any area that will be at risk from an errant missile in the time immediately after launch, before the Missile Flight Safety Officer could react to the malfunction (i.e., several seconds). During the flight, telemetry data provide real-time monitoring for the test vehicle. The Missile Flight Safety Officer operates the Flight Termination System and activates destruct commands if a missile malfunctions, leaves a predefined region or violates other mission rules. These controls provide a mechanism to protect the public with very high reliability, even in the unlikely case of a missile malfunction.

Teams are available at the KLC for fire suppression, hazardous materials emergency response, and emergency medical response during launch activities. KLC personnel take every reasonable precaution during the planning and execution of range operations and launch activities to prevent injury to human life or damage to property.

Broad Ocean Area. No Health and Safety issues are anticipated during the over flight operation.

U.S. Army Garrison Kwajalein Atoll/Reagan Test Site. USAGKA/RTS would provide range support for the terminal phase of flight. USAGKA/RTS is the target area for missile launch operations from many Pacific area launch locations, including the KLC. All program operations must first receive the approval of the Safety Office at

USAGKA/RTS. Final responsibility and authority for the safe conduct of missile and flight test operations lies with the USAGKA/RTS Commander.

Land:

Proposed actions take place on lands and facilities that are designed, operated, and maintained for launch and test demonstration activities. Short-duration deployment of the mobile telemetry and safety systems during the test flight use existing roads and occupy a small footprint of controlled-access ground surface with line of sight to the booster vehicle during flight operations.

Noise:

Kodiak Launch Complex. Noise would include transport vehicles, maintenance equipment, generators, and the launching and improbable detonation of test missiles. KLC supports a variety of sounding rocket missions; therefore, occasional rocket, missile, or drone launches produce high-intensity, short-duration sound events.

Previously collected noise data at nearby monitoring stations on Ugak Island indicate noise levels from launches range to levels as high as 91.4 A-weighted decibels (dBA) which is comparable to a gasoline-powered lawn mower. The nearest seasonal residents are located about 2.5 miles from KLC, and the nearest year-round housing is located over 4 miles from the facility. Both locations are in low-lying areas and neither has direct line of sight to the launch facility. The short duration of the proposed AHW FT2 HTT launch, as well as the shadow effect from local topography, buffers local populations from significant, direct noise exposure during the launch.

Broad Ocean Area. No noise impacts are anticipated during over flight operations.

U.S. Army Garrison Kwajalein Atoll/Reagan Test Site. As the AHW FT2 HTT nears USAGKA/RTS, the vehicle would maneuver toward the pre-designated impact site at Illeginni Islet. During vehicle descent, a focused boom would occur over the islet and the atoll. Although considered reasonably loud (123 decibels [dB] based on a sonic boom overpressure of 0.6 pound per square foot), such noise levels are audible only once at each location, last no more than a fraction of a second, and are well within the Army standard of 140 dB (peak sound pressure level) for impulse noise. Because Carlos, Ebeye, Kwajalein, and the other populated islets are located outside the sonic boom footprint, residents at these locations may not hear the noise at all.

Water Resources:

Kodiak Launch Complex. Under nominal launch conditions, no water resource impacts are expected because rocket motor exhaust emissions are dispersed to nontoxic levels away from the launch site. In the unlikely event of an accidental spill or premature flight termination that resulted in propellant coming in contact with water resources, emergency response personnel would implement the KLC Emergency Response, Hazardous Materials Management, and Hazardous Waste Management Plans.

USAGKA/RTS. An impact in the lagoon or ocean adjacent to Illeginni would have comparable, insignificant impacts as described for the Brood Ocean. An inadvertent BOA impact during the AHW FT2 HTT would not significantly impact the composition of the surrounding seawater or biological diversity of marine life present.

FINDING: Based on the analysis presented in the EA and coordination with applicable agencies such as the RMI Environmental Protection Authority, National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the U.S. EPA, as well as governmental authorities and stakeholders in the State of Alaska, the USASMDC/ARSTRAT finds that implementation of the Proposed Action would not significantly impact the quality of the human or natural environment.

CONCLUSION: The resulting environmental analysis shows that no significant impacts would occur from the proposed activities; preparation of an Environmental Impact Statement, therefore, is not required. The AHW FT2 HTT will follow prescribed conservation measures provided in the Summary of Environmental Management and Monitoring Actions.

POINT OF CONTACT for the AHW FT2 HTT Environmental Assessment is:
U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command
Attention: SMDC-EN-V (Mark Hubbs)
Post Office Box 1500
Huntsville, AL 35807-3801

Concur: 2 Jun 14

DAVID HASLEY (date)
Chief, Environmental Division
Deputy Chief of Staff, Engineer
USASMDC/ARSTRAT

Approve: Julie Schumacher 6/30/14

JULIE SCHUMACHER (date)
Director, Technical Center
USASMDC/ARSTRAT

EXECUTIVE SUMMARY

This Environmental Assessment document analyzes the aspects and impacts related to a proposed Hypersonic Technology Test demonstration. The assessment conforms to regulatory requirements developed by the Council on Environmental Quality as required by the National Environmental Policy Act. Furthermore, the assessment also complies with the procedures defined by the USAKA Environmental Standards, 12th Edition.

The purpose of the proposed action is to collect data related to hypersonic flight techniques to share with collaborating Department of Defense agencies. The AHW FT2 HTT is needed to test the maturity of several key technologies and concepts in the unique environments of hypersonic flight that cannot be fully replicated in ground-based testing facilities. The proposed action consists of pre-flight, launch, and post-flight activities. These activities are performed at a number of facilities within the Continental United States and at the Reagan Test Site on Kwajalein Atoll in the Republic of the Marshall Islands.

The preferred alternative satisfies test objectives using launch facilities at the Kodiak Launch Complex in Alaska and terminating at Illeginni Islet on Kwajalein Atoll. The demonstration is fully consistent with the missions and functions at both facilities; neither requires infrastructure improvements. Both facilities previously hosted substantially similar tests, and these previous events provide an objective baseline to evaluate the proposed action.

The National Environmental Policy Act requires a description of the environment to identify resources and sensitive receptor groups that may be potentially affected by the proposed action. Affected resources are intrinsic to the physical locations where the action occurs and include air quality, airspace, biological and cultural resources, hazardous waste and materials, pollution prevention, health and safety, noise and water resources (including wetlands, coastal zones, and the broad ocean). Other resources such as those related to land use (including farms, floodplains, and geology), infrastructure, and socioeconomic concerns are also considered.

The analytical portion of the Environmental Assessment evaluates issues and impacts to understand the consequence and significance of the effects directly and indirectly related to the proposed action. The depth and breadth of the analyses trend with the potential severity of environmental impacts for each of the affected environments and resources.

The conclusions of the Environmental Assessment are that the proposed action and the preferred alternative do not pose significant environmental impact to the affected environments. A Finding of No Significant Impact is proposed for this action and preferred alternative.

ACRONYMS AND ABBREVIATIONS

µg	Micrograms
ACC	Alaska Aerospace Corporation
AFRL	Air Force Research Laboratory
AFSCMAN	Air Force Systems Command Manual
ALTRV	Altitude Reservation
ARSTRAT	Army Forces Strategic Command
ARTCC	Anchorage Air Route Traffic Control Center
BOA	Broad Ocean Area
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CESQG	Conditionally Exempt Small Quantity Generator
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CH_4	Methane
CO	carbon monoxide
CO_2	carbon dioxide
dB	decibels (absolute, unadjusted)
dBA	decibels (adjusted, for range of human hearing)
DoD	Department of Defense
DOE	Department of Energy
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
ETR	Extended Test Range
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FL	flight level
FONSI	Finding of No Significant Impact
FTS	Flight Termination System
GHA	Ground Hazard Area
GHG	Greenhouse gases
GMD	Ground-Based Midcourse
HGV	Hypersonic Glide Vehicle
HMTA	Hazardous Materials Transportation Act
HSWA	Hazardous and Solid Waste Amendments of 1984
AHW FT2 HTT	Hypersonic Technology Test
Hz	Hertz
ICAO	International Civil Aviation Organization
LHA	Launch Hazard Area
LLNL	Lawrence Livermore National Laboratory

KEEP	Kwajalein Environmental Emergency Plan
KLC	Kodiak Launch Complex
m^3	cubic meter
MILSTD	Military Standard
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NAVSEA	Naval Sea Systems Command
NEPA	National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Services
NOx	nitrogen oxides
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOTAMs	Notices to Airmen
NOTMARs	Notices to Mariners
NSWC	Naval Surface Warfare Center
NWHI	Northwestern Hawaiian Islands
O_3	Ozone
Pb	Lead
PM_{10}	Particulate Matter (10 micron, respirable)
$PM_{2.5}$	Particulate Matter (2.5 micron, fine)
RCC	Range Commanders Council
RCRA	Resource Conservation and Recovery Act
RMI	Republic of the Marshall Islands
RMI	Republic of the Marshall Islands Environmental Protection Authority
RTS	Regan Test Site
SDS	Safety Data Sheets
SEL	Sound Exposure Level (time-weighted)
SMDC	Space and Missile Defense Command
SOx	Sulfur dioxide
STARS	Strategic Target System
START	Strategic Arms Reduction Treaty I
tpy	tons per year
TSCA	Toxic Substance Control Act
USAGKA	US Army Garrison Kwajalein Atoll
USC	United States Code
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
UTC	Universal Time Coordinated
VOC	Volatile Organic Compounds

TABLE OF CONTENTS

Figures

Tables

1.0 PURPOSE AND NEED FOR PROPOSED ACTION

1.1 BACKGROUND

The United States of America (US) currently uses conventional delivery methods to deploy strikes on foreign threats primarily through the use of forward-based systems (e.g., tactical aircraft, cruise missiles, unmanned aerial vehicles, and heavy bombers). Effective use of these systems requires: (1) adequate time to pre-position strategic assets (e.g. aircraft and/or missiles) within range of the targets; (2) minimize risks from local air defenses; and (3) when needed, have extensive mission support assets available (e.g. aircraft refueling tankers).

Over the past several years, the US Department of Defense (DoD) sponsored missile defense programs that have been developing and demonstrating technologies for long range, global strike capability. This capability would provide the President with the ability to promptly engage targets at strategic range without the use of nuclear weapons.

The US Army Space and Missile Defense Command (SMDC) and Army Forces Strategic Command (ARSTRAT) provide development and testing support to the missile defense program. The SMDC/ARSTRAT is responsible for the Advanced Hypersonic Weapon Flight Test 2 Hypersonic Technology Test (AHW FT2 HTT) that boosts a hypersonic glide body vehicle to high altitude for accurate delivery. The US Army intends to use existing facilities at the Kodiak Launch Complex (KLC) in Alaska and the Reagan Test Site (RTS) on US Army Garrison Kwajalein Atoll (USAGKA) to test those capabilities.

This Proposed Action is being analyzed in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, 42 United States Code (USC) 4321 et seq., its implementing regulations, 40 Code of Federal Regulations (CFR) 1500-1508; and Environmental Analysis of Army Actions, 32 CFR Part 651. It is the responsibility of USASMDC/ARSTRAT to ensure that such actions comply with NEPA.

1.2 PURPOSE AND NEED

The purpose of the proposed AHW FT2 HTT demonstration is to collect data related to hypersonic flight techniques to share with collaborating Department of Defense agencies. The AHW FT2 HTT is needed to test the maturity of several key technologies and concepts in the unique environments of hypersonic flight that cannot be fully replicated in ground-based testing facilities.

1.3 RELATED ENVIRONMENTAL DOCUMENTATION

Environmental documents for some of the programs, projects, and installations within the geographical scope of this Environmental Assessment (EA) that have undergone environmental review to ensure NEPA and Executive Order (EO) 12114 compliance include:

- Environmental Standards and Procedures for United States Army Kwajalein Atoll Activities in the Republic of the Marshall Islands, 12th Edition, 2011
- Advance Hypersonic Weapon Program Environmental Assessment, June 2010
- Final Environmental Assessment for Conventional Strike Missile Demonstration, 2010
- Pacific Missile Range Facility Intercept Test Support, Environmental Assessment/Overseas Environmental Assessment, 2010
- Final Environmental Assessment for Hypersonic Technology Vehicle 2 Flight Tests, 2009
- Hawaii Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement, 2008
- Environmental Monitoring Report FTG-02 Launch, Kodiak Launch Complex, December 2006.
- Environmental Assessment for Minuteman III Modification, 2004
- Ground-Based Midcourse (GMD) Extended Test Range (ETR) Final Environmental Impact Statement, July 2003
- North Pacific Targets Program, Environmental Assessment, 3 April 2001
- Kodiak Launch Complex Environmental Assessment, May 1996
- US Army Kwajalein Atoll (USAKA) Supplemental Environmental Impact Statement, 1993
- Strategic Target System Environmental Assessment, 1992
- Strategic Target System Environmental Impact Statement, 1992
- Environmental Assessment for Department of Energy (DOE) Reentry Vehicles, Flight Test Program, US Army Kwajalein Atoll, Republic of the Marshall Islands, 1992
- Environmental Assessment Missile Impacts, Illeginni Island at the Kwajalein Missile Range, Kwajalein Atoll Trust Territory of the Pacific Islands, 1977

1.4 PUBLIC NOTIFICATION AND REVIEW

In accordance with the Council on Environmental Quality and DoD regulations for implementing NEPA, USASMDC/ARSTRAT have solicited comments on an Environmental Assessment and a Finding of No Significant Impact (FONSI) from interested and affected parties. Notice of

Availability (NOA) for the EA and FONSI has been published in the following newspapers (Table 1-1):

Table 1-1 Local Newspapers

Country or State	City/Town	Newspaper
Alaska	Anchorage	Anchorage Daily News
Alaska	Kodiak	Kodiak Daily Mirror
Republic of the Marshall Islands	Majuro	Marshall Islands Journal
	USAGKA/RTS	Kwajalein Hourglass

Notices of Availability posted in the *Marshall Islands Journal* and *Kwajalein Hourglass* also have Marshallese translations included. Copies of the EA and FONSI will be placed in local libraries and made available on an Internet website (www.ahw-ft2-htt-ea.info). Coordinating agencies, organizations, and libraries that will receive a copy of the EA/ FONSI are listed in Appendix A. Appendix B contains related agency correspondence.

1.5 DECISION(S) TO BE MADE

After completing the 30-day public review period specified in the newspaper notices, and USASMDC/ARSTRAT will consider public and agency comments received to decide whether to (1) sign the FONSI, which would allow the Proposed Action to proceed; or (2) conduct additional environmental analysis for the AHW FT2 HTT demonstration.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Three actions are analyzed in this EA - the Preferred Alternative, Broad Ocean Area (BOA) Impacts Alternative, and the No-action Alternative. Within this chapter, Section 2.1 describes the Proposed Action and Alternative for the AHW FT2 HTT, including launch support facilities, rocket motor and vehicle transportation, pre-launch activities, flight testing, and post launch operations. Section 2.2 describes the No-Action Alternative. Alternatives to the Proposed Action that were considered and eliminated from further study are discussed in Section 2.3.

2.1 PROPOSED ACTION

The AHW FT2 HTT would consist of a mechanical Pathfinder demonstration and flight test originating from KLC designed to test and evaluate several key hypersonic techniques and technologies. The Mechanical Pathfinder activities provide a mission demonstration up to the point of launch using unfueled and inert components. The launch would include a flight using a 3-stage Strategic Target System (STARS) IV booster. A Hypersonic Glide Vehicle (HGV) would be the payload on the Strategic Target System booster. Data gathered during the launch and flight test would be used to better understand hypersonic technologies and environments in which such systems must operate.

2.1.1 Test Booster Description

The STARS IV booster system consists of a three-stage propulsion system using decommissioned motors from the US Navy. The test vehicle is similar in many respects to the booster successfully launched on nine other occasions at the Kodiak Launch Complex. Table 2-1 provides a summary of the STARS booster system characteristics.

Table 2-1 Test Booster System Characteristics

Structure	Composition: Aluminum, titanium, steel, tantalum, tungsten, carbon, silica, and other alloys (No radioactive alloys are contained within structure) Height: 571 inches (STARS IV configuration)
Propulsion and separation	Rocket motors: Three-stage, solid fuel propellant system containing various nitrogen-based propellants and explosives, inert and reactive metals and binding agents, and small amounts of asbestos-phenolic compounds, compressed nitrogen Separation devices, jettison and retrograde motors: various nitrogen-based propellants and explosives
Power	Rechargeable lithium batteries
Range	3,500 miles*
Ceiling	1,550 miles*

*estimated

Source: Directory of US Rockets and Missiles

The proposed AHW FT2 HTT flight from KLC uses a booster system that has been previously certified compliant with the Strategic Arms Reduction Treaty I (START I) and the Intermediate-Range Nuclear Forces Treaty. The flight test is designed to travel approximately 3,500 miles, with an instrumentation package. The instrumentation package is designed to gather data to validate HGV assumptions.

If the launch vehicle were to deviate from its course or should other problems occur during flight, then the Missile Flight Control Officer would activate the Flight Termination System (FTS) on the vehicle. Thrust is terminated by initiation of an explosive charge that splits or vents the motor casing, which releases pressure and significantly reduces propellant combustion. This action would stop the booster's forward thrust, causing the launch vehicle to fall along a descending trajectory into the ocean. Other explosive charges located within the Payload Assembly would disable the payload and vehicle's ability to fly if it separated from the booster prematurely.

2.1.2 Test Article Description

The AHW FT2 HTT will test the launch, flight test, targeting capability and application of hypersonic flight performance technologies. The test article vehicle is designed to fit inside a shroud and its mass at launch is well-within the payload capability of the proposed boosters. **Error! Reference source not found.** lists the test article key system characteristics.

Table 2-2 Test Article System Characteristics

Structure	Aluminum, titanium, steel, tantalum, tungsten, carbon, silica, Teflon®, and alloys containing chromium, magnesium, and nickel
Communications	Various 5- to 20-watt (radio frequency) transmitters; maximum 400-watt radio frequency pulse
Power	Lithium-ion and Nickel metal-hydride batteries
Propulsion	None
Other	Mechanical and flight termination systems: explosive bolts, line cutters, initiators and explosive charge

As shown in **Error! Reference source not found.**, hazardous materials used in the test article payload would be limited to batteries and several small explosive devices. No solid or liquid propellants, depleted uranium, beryllium, or radioactive materials would be carried on the HGV test article. Each battery would be environmentally qualified, including safeguards for containing accidental hazardous battery casing leak or electrical anode or cathode shorting. All explosive devices would be handled in accordance with DoD 6055.09-STD.

2.1.3 Test Support Facilities

Support facilities are used at the assembly, testing, transportation, and launch locations related to the proposed action. The AHW FT2 HTT and associated activities require no new or event-related construction.

2.1.3.1 Storage and Processing Facilities

The proposed AHW FT2 HTT vehicle booster, jettison, and retrograde motors are stored and processed at existing National Laboratory, Test Range and Depot facilities in Arizona, Nevada, New Mexico, Utah, as well as at the Redstone Arsenal in Alabama.

2.1.3.2 Testing Facilities

The proposed ground testing activities for the test article would include the following:

- Shock and vibration
- Pyro shock
- Force and pressure
- Centrifuge
- Explosive component
- Electrical systems
- Hardware-in-the-Loop

All ground testing and certification activities listed above would occur in existing support facilities described below.

Air Force Research Laboratory, New Mexico

Building 595 at the Air Force Research Laboratory (AFRL) would be the site for shock and vibration testing, and assembly and handling for all supporting tests. These proposed activities would be consistent with routine and ongoing operations at existing AFRL facilities.

ATK Launch Systems, Magna, UT

ATK provides non-destructive motor testing support facilities for some propulsion system components. These proposed activities are also consistent with routine and ongoing operations at existing facilities.

Redstone Arsenal, Alabama

The US Army Aviation and Missile Research Development and Engineering Center provides the ancillary testing support facilities to design, test, analyze, and fabricate certain elements of flight

hardware for the AHW FT2 HTT. Redstone Arsenal also provides jettison motors and several other system components.

Sandia National Laboratories, New Mexico

The DOE Sandia National Laboratories provide a variety of production and testing support facilities to design, test, analyze, and fabricate flight and test vehicle hardware for the AHW FT2 HTT.

2.1.3.3 Storage Facilities

Motors for the AHW FT2 HTT are stored at secure facilities at Camp Navajo, AZ, Hawthorne Army Depot, NV, Redstone Arsenal, AL and Kirtland AFB, NM. Tooele Army Depot also provides interim storage facilities for motors in transit to the launch site at KLC, located at Narrow Cape, Alaska. These storage activities are consistent with routine and ongoing operations at existing facilities on these installations.

2.1.3.4 Transportation Facilities

The proposed surface and air transportation activities associated with the preferred alternative utilize established Government and commercial facilities during the test life cycle. All transportation and logistics for the Mechanical Pathfinder and launch related activities occur in full accordance with a mission logistics plan. Ground Support Equipment required during the transportation sequence exist onsite at the transportation nodes or are carried as incidental cargo.

NAVSEA CRANE would provide flight-certified Strategic Target System first, second, and third stages to the launch site at KLC, located at Narrow Cape, Alaska. NAVSEA CRANE would also provide one each of the first and second stages at Tooele Army Depot, Utah, and one third stage at Hawthorne Army Depot ready for certification and assembly as spares. These proposed activities would be consistent with routine and ongoing operations at existing Redstone Arsenal, Hawthorne Army Depot and Tooele Army Depot facilities.

All transportation, handling, and storage of the rocket motors and other ordnance would occur in accordance with DoD, US Army, US Air Force and US Department of Transportation policies and regulations to safeguard the materials from fire or other mishap.

Ocean-going freight for the Mechanical Pathfinder would use existing dock facilities in Kodiak, and the military aircraft transporting motors and the HGV would land at Kodiak Airport, Alaska; a joint civilian-military airfield located on Kodiak Island. The dock and airport is located about 45 road miles from KLC and are connected by an improved road system on Kodiak Island. Aircraft scheduling would be done by the US Air Force. Palletization of the AHW FT2 HTT components

would be done by SNL personnel at Hill AFB. The components would leave Hill AFB via aircraft following logistics coordination, shipping preparation, palletization, and loading of the flight article, the handling gear, and the ground support equipment.

The US Air Force would be contracted by the US Navy, NAVSEA Crane Division to transport the rocket motors from Dugway Proving Grounds Airfield, to KLC for launch preparation.

Ground Transportation

Various consolidation and testing efforts for the proposed action involve ground transportation via highway and rail. Existing infrastructure provides sufficient capacity for the associated activities.

Port of Seattle and Tacoma

Commercial barge and container shipping companies provide routine, scheduled services from port facilities in Seattle and Tacoma. The existing facilities are adequate to support the in-transit transportation contingencies related to the test.

Women's Bay Terminal Dock

The Terminal Dock acts as a marine receipt point for ocean-going deliveries to Kodiak for the Mechanical Pathfinder and AHW FT2 HTT mission. The dock is owned by LASH Corporation and operated by Seaport Terminal Services, Inc. The facility supported previous missions; all current facilities are sufficient for the preferred alternative.

Hill Air Force Base

Hill AFB acts as the air transport point of departure for numerous critical test components en route to the Kodiak Launch Complex. The existing airfield facilities are adequate to support the in-transit transportation contingencies related to the test.

Elmendorf Air Force Base

Elmendorf Air Force Base acts as an alternate, diversion airport in Alaska for AHW FT2 HTT-related air cargo shipments. The existing airfield facilities are adequate to support the in-transit transportation contingencies related to the test.

Kodiak State Airport

The Kodiak Airport provides support for scheduled commercial passenger and cargo flight operations as well as the co-located US Coast Guard Station, Kodiak. The existing airfield facilities are adequate to support the in-transit transportation contingencies related to the test.

Road System Transportation

Surface transportation infrastructure between airport/dock and the Kodiak Launch Complex use existing, improved roads that provide sufficient capacity for the associated activities.

Bucholz Army Airfield, US Army Garrison Kwajalein Atoll

The Bucholz Army Airfield on Kwajalein is not directly involved in the AHW FT2 HTT preparation and launch, but the facility provides critical support to the overall mission during the flight test and post-flight activities. Existing facility assets provide a transportation hub for activities at the installation.

2.1.3.5 Assembly and Launch Facilities

The proposed AHW FT2 HTT launch would occur at the KLC Launch Service Structure Pad 1. No new construction would be required to use this launch facility.

Prior to launch, routine activities would take place at the KLC to prepare for flight testing. These activities are described below. While working within the guidance and limitations of the KLC Range Integrator oversight, project personnel would execute ground equipment checkout, flight vehicle to booster assembly and checkout, and other preparations for flight testing. These activities would be directed by USASMDC/ARSTRAT personnel who would coordinate activities with KLC Range Integrator and other range organizations. All activities would use existing facilities and infrastructure systems. Other launch supporting activities would include the following:

- Motor Processing for the Strategic Target System vehicle by personnel from NSWC Crane and SNL
- Final motor and payload assembly and integration
- Mechanical and electrical checkouts (equipment tested, controls of electronic components-systems exercised before launch activities)
- Demonstration of system performance prior to launch
- Placement of missile on existing pad
- Preflight checkouts, recommendations, and consultation
- Advisory role throughout launch operations

2.1.4 Flight Test

The AHW FT2 HTT test flight is planned to originate from the Kodiak Launch Complex and terminate in the vicinity of Illeginni Islet, US Army Garrison Kwajalein Atoll (USAGKA).

2.1.4.1 Kodiak Launch Complex

KLC is located on State of Alaska land and is operated by the Alaska Aerospace Corporation (AAC), a state owned corporation, under an operating permit issued by the Federal Aviation Administration (FAA).

Launches of the Strategic Target System boosters were initially analyzed in the 1996 KLC EA, the 2001 North Pacific Targets Program EA, the 2003 GMD ETR EIS, and the 2006 KLC FTG-02 Launch Environmental Monitoring Report. The proposed test article would travel a distance of approximately 3,500 miles to Illeginni Islet. The proposed flight test is scheduled for some time in 2014.

While working within the supporting infrastructure of the KLC, personnel would execute ground equipment checkout, booster assembly, flight vehicle to booster assembly and checkout, and other preparations for flight testing. These activities would be directed by mission personnel who would coordinate activities with KLC, USAGKA and other range organizations. All activities would use existing facilities and infrastructure systems. Other launch supporting activities would include the following:

- Final motor and payload assembly and integration
- Mechanical and electrical checkouts (equipment tested, controls of electronic components-systems exercised before launch activities)
- Demonstration of system performance prior to launch
- Placement of missile on existing pad
- Preflight checkouts, recommendations, consultation

Associated flight operations would include the support activities outlined in Section 2.1.3.

2.1.4.2 Illeginni Islet

Illeginni Islet is located on the western side of the Kwajalein Atoll and previously served as flight test termination site for numerous ballistic and target test flights. The location is uninhabited, isolated, and has existing infrastructure and other surface assets to support terminating the proposed test.

2.1.4.3 Broad Ocean

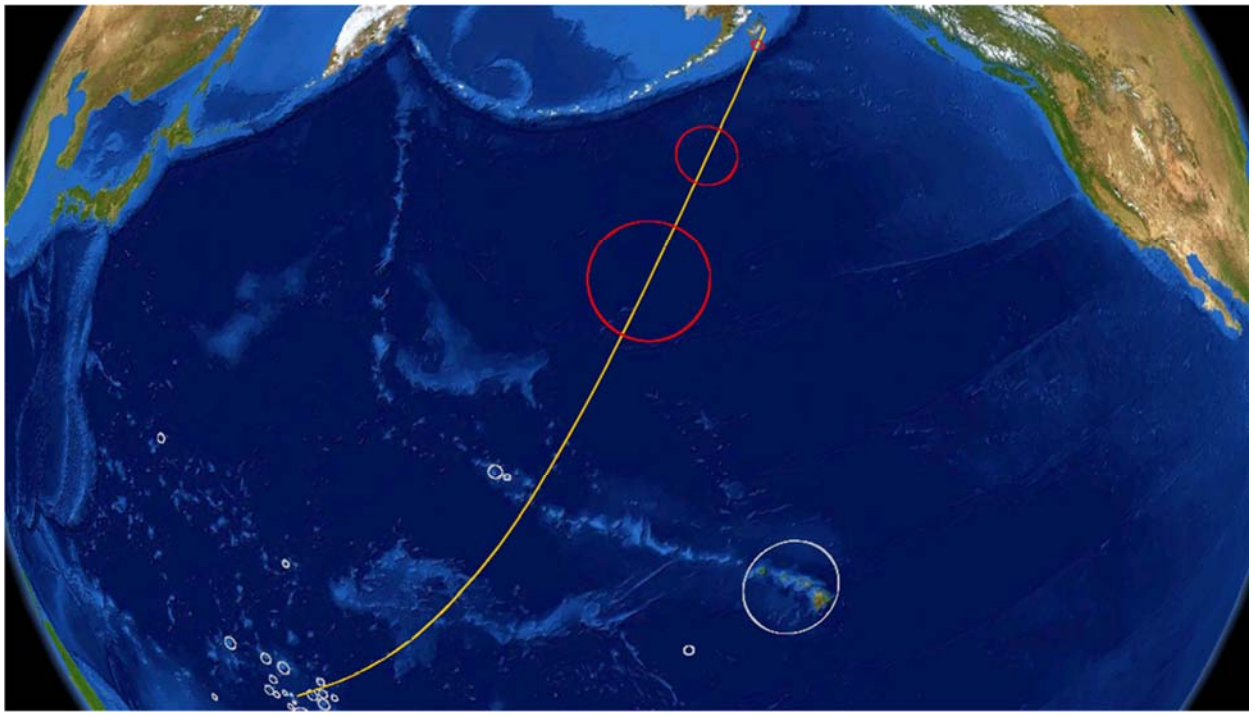
Flight test termination in the Broad Ocean, either inside or outside the lagoon adjacent to Illeginni Islet, is a subsurface alternative. This alternative uses anchored arrays of telemetry and other sensors for test evaluation and requires infrastructure augmentation.

2.1.5 Flight Scenarios

2.1.5.1 Flight Path

At launch, the first stage motor ignites and boosts the vehicle assembly while traveling in a southerly direction across the Gulf of Alaska toward the northern Pacific Ocean as shown in Figure 2-1 (the estimated booster stage drop zones are indicated by red circles).

Figure 2-1 Model Hypersonic Technology Test Flight Path



Following motor ignition and liftoff, the first-stage motor would burn out and separate from the second stage. Further into flight, the second-stage and third-stage motors would also burn out and separate. Splashdown of all three spent motor stages, the nose shroud, and skin extensions would occur at different points in the open ocean between the launch site and the proposed target (a distance of approximately 3,500 miles).

Jettison of the shroud and skin extensions, and test article separation would occur outside the atmosphere at an altitude of several hundred thousand feet. Prior to separation, the third stage cold gas Attitude Control System is used to orient the payload for a safe separation. After separation, the test article uses control surfaces to begin the hypersonic portion of the test flight. The flight path would extend well north of the Hawaiian Islands, flying over a portion of the Northwestern Hawaiian Islands (NWHI). As the payload nears USAGKA (the terminal end of flight), it would maneuver towards pre-designated target sites.

If a malfunction were to occur during the test flight, the onboard flight termination system would be activated. This action would initiate a predetermined safe mode for the vehicle, causing it to fall toward the ocean and terminate flight. No inhabited land areas would be subject to unacceptable risks of falling debris. Computer-generated destruct lines, based on no-impact lines, are pre-programmed for the flight safety software to avoid any debris falling on inhabited areas, per Space System Software Safety Engineering protocols and US range operation standards and practices. Flight tests are programmed in accordance with US range operation standards, to protect and ensure safety of the general public.

2.1.5.2 Sensor Coverage

Flight path observation and analysis occurs at the launch facility and on the terminal end of the flight test. The sensor network was previously in the Ground-Based Missile Defense Extended Test Range EIS. A series of sensors overlap coverage of the flight from launch at KTF until impact at USAGKA. The sensors would include:

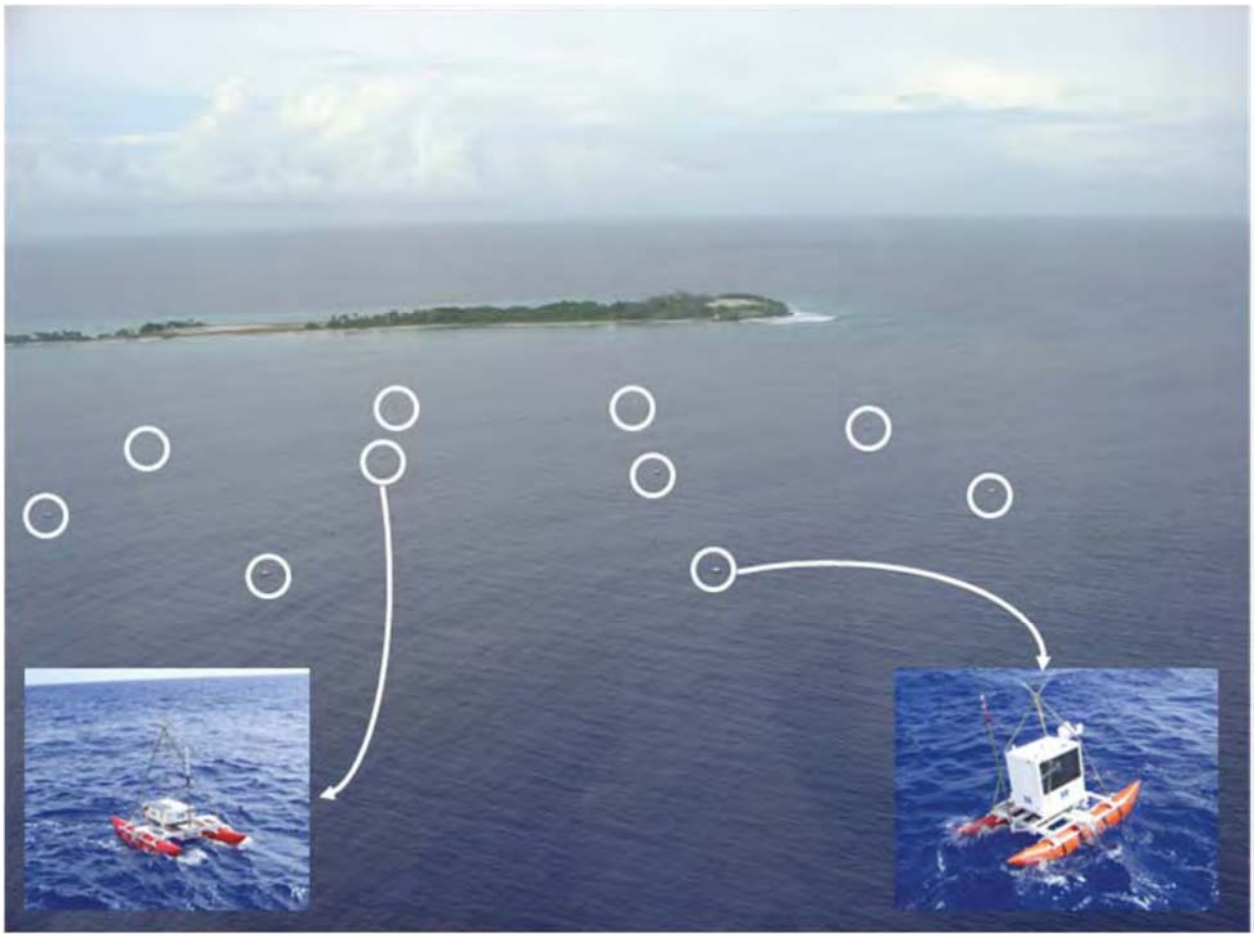
- Ground based telemetry systems that may be placed downrange at Pasagshak Point (on Kodiak Island), Old Harbor, Alaska, or Sand Point, Alaska
- Sea-based sensors on the US Motor Vessel *Worthy*, which is part of the Kwajalein Mobile Range Safety System, PIRATES 1 and 2, Pacific Collector and Pacific Tracker .
- Airborne sensors on aircraft such as the High Altitude Observatory (HALO).

Tracking and telemetry sensors operate as a part of existing programs. The Range Safety and Telemetry Systems deployed to Old Harbor and Sand Point are self-sufficient and contained in vans and trailers (Figure 2-2). No new or improved facilities or support infrastructure are needed.

Figure 2-2 Mobile Range and Safety System

For Illeginni and broad ocean impacts, precision scoring augmentation sensors are deployed for supplemental data collection and evaluation. Figure 2-3 shows an example deployment configuration used for a previous test event.

Figure 2-3 Example Precision Scoring Augmentation Sensor Deployment



2.1.6 Terminal Phase Preparations and Operations

The Reagan Test Site has been a flight test impact area for more than 16 years. At RTS, target sites for test impacts are located in the deep ocean area east of the Kwajalein reef or in the vicinity of Illeginni Islet. Vehicle impacts from other tests have occurred within the Kwajalein Atoll lagoon, on and in the vicinity of Illeginni Islet, and in the Broad Ocean Area (BOA) outside the atoll.

Upon reaching the terminal end of the flight, the payload would either impact on the northwestern end of Illeginni Islet (Preferred Alternative) or in the BOA northeast of Kwajalein Atoll or southwest of Illeginni Islet. Debris would be recovered and the crater filled for a land impact. Visible debris would be removed following any unintentional shallow water impact. A reef or

shallow water impact is not part of the Proposed Action, would be unintentional, and is highly unlikely.

These and other actions within the geographical scope of this EA have undergone environmental analyses and reviews; references are provided in Section 1.3 and Section 5.0.

Following launch over the Pacific Ocean, the payload would separate from the booster and glide at hypersonic velocities in the upper atmosphere toward Kwajalein. If the flight test expends more energy earlier than planned, the payload would fall short of the target and impact in the broad ocean, northeast of Kwajalein Atoll.

To ensure the safe conduct of this type of test, a Mid-Atoll Corridor Impact Area has been established across the mid-section of the atoll. When a test is to occur in this area, a number of strict precautions are taken to protect personnel. Such precautions may consist of evacuating nonessential personnel and sheltering all other personnel remaining within the Mid-Atoll Corridor. Notices to Airmen (NOTAMs) and Notices to Mariners (NOTMARs) are published and circulated in accordance with established procedures to provide warning to personnel, including native Marshallese citizens, concerning any potential hazard areas that should be avoided. Radar and visual sweeps of the hazard area are accomplished immediately prior to test flights to ensure the clearance of non-critical personnel.

Precision Scoring Augmentation Rafts with onboard optical and/or acoustical sensors may be placed near Illeginni Islet or in the target BOA impact areas. Within a day of the flight test, one or two of the RTS landing craft utility vessels would be used to deploy the rafts. The rafts would be equipped with battery-powered electric motors for propulsion to maintain position in the water. Sensors on the rafts would collect data during the payload's descent until impact.

There is a slight potential for sea turtles to haul out or nest on Illeginni Islet. As close to the time of the AHW FT2 HTT demonstration as safely practical, qualified personnel would inspect the northwestern end of Illeginni Islet for sea turtles or sea turtle nests. They would report such sighting to the USAGKA Environmental Management Office, the RTS Range Directorate, and the Kwajalein Test Director at the launch facility. Sightings of sea turtles or sea turtle nests in the impact area would result in a launch delay.

Because whales and other marine mammals are found in the vicinity of Illeginni Islet, qualified personnel would conduct a helicopter or fixed-wing aircraft over flight of the islet vicinity as close to the proposed AHW FT2 HTT launch time as safely practical. If personnel observe marine mammals in the near shore area, or moving towards the near shore area, they would report such sightings to the USAGKA Environmental Management Office, the RTS Range Directorate, and

the Kwajalein Test Director at the launch facility. Sightings in the near shore area would result in a launch delay.

In the event of a BOA impact southwest of Illeginni or northeast of the Atoll, mission support and RTS personnel would conduct a helicopter or fixed-wing aircraft over flight of the impact vicinity as close to the time of the AHW FT2 HTT demonstration as safely practical. If personnel observe marine mammals or sea turtles near the impact area, or moving towards the impact area, they would report such sightings to the USAGKA Environmental Management Office, the RTS Range Directorate, and the Flight Test Operations Director. Sightings in the impact area would result in a launch delay.

2.1.7 Post-Launch Operations

At the launch location at KLC, the launch pad area would be checked for safe access after vehicle liftoff. Post-launch activities would include inspection of the launch pad facilities and equipment for damage, as well as general cleanup and performance of maintenance and repairs necessary to accommodate any future launches. The expended rocket motors and other vehicle hardware would not be recovered from the ocean following flight.

Post-test recovery operations at Illeginni Islet require the manual cleanup and removal of any debris, including hazardous materials uncovered by the test. Prior to recovery and cleanup actions at the impact site, unexploded ordnance personnel would first survey the impact site for any residual explosive materials. Following completion of the target damage assessment, personnel would recover all visible debris. As much debris shall be recovered as reasonably prudent near the impact crater, to include collecting visible debris from the payload that is in the crater and on the island. The impact crater shall be excavated to recover small particle debris after scoring and mapping operations are complete, using standard RTS and Lawrence Livermore National Laboratory (LLNL) procedures involving screening and washing of material removed from the crater.

Following removal of all payload items and any remaining debris from the target site, the crater would be backfilled with rock and sand ejected around the rim of the crater and, if necessary, repairs made to the impact area. Backfilling on land would be accomplished with mechanized equipment and by hand. Accidental spills from support equipment operations would be contained and cleaned up. All waste materials would be returned to Kwajalein Island for proper disposal.

A qualified biologist would inspect the impact site as soon as safely practical after the event to determine if there are any adverse effects to protected species or critical habitat. If so, representatives from the RMI Environmental Protection Authority, National Marine Fisheries Service and US Fish and Wildlife Service would also be invited to inspect the site as soon as

practical after the event. They would assess any damage to coral and other resources and, in coordination with USAGKA, would decide on any mitigation measures that may be required.

If an inadvertent impact occurs on the reef, reef flat, or in shallow waters less than 100 feet deep, a qualified biologist would inspect the impact site as soon as safely practical after the event. Representatives from the RMIEPA, NMFS and USFWS would be invited to inspect the site. They would assess any damage to coral and other resources and, in coordination with USAGKA, would decide on any mitigation measures that may be required.

Recovery operations on the reef flat are conducted similarly to land operations when tide conditions and water depth permit. Should the payload inadvertently impact in the deeper waters of the atoll lagoon (up to approximately 160 feet), a dive team would be brought in to conduct underwater searches. Using a ship for recovery operations, divers in scuba gear may recover debris from the lagoon bottom manually.

In general, test article recovery operations would not be attempted in the broad ocean, with the exception of debris found floating on the surface. Searches for debris could be attempted in the ocean out to depths of 50 to 100 feet. An underwater operation similar to a lagoon recovery would be used if debris were located in this area.

2.2 PREFERRED ALTERNATIVE

2.2.1 Site Preparation

The test targeting vehicle is planned to impact in the vicinity of Illeginni Islet. The Preferred Alternative includes a land impact on Illeginni. This would impact an area approximately 950-feet by 450-feet on the northwest end of Illeginni Islet as limited by an available land mass. The yellow border on Figure 2-5 indicates the preferred target area. It would be located west of the tree line to avoid affecting the bird habitat on the islet. The mission planning process would avoid to the maximum extent possible all potential risks to environmentally significant areas.

In preparation for the test event, various test support equipment and materials would be shipped to the range for temporary placement on Illeginni Islet. The equipment and materials would first be transported to Kwajalein Islet on a ship and/or normally scheduled flights. Prior to shipment from the United States to USAGKA, the equipment would be washed and a certified Pest Control Technician or Military Veterinarian would inspect the equipment to ensure that it does not contain any insects, animals, plants, or seeds. The wash and inspection process would help prevent exotic species from being introduced into the Republic of the Marshall Islands.

From Kwajalein Islet, the test support equipment and materials and other required range equipment would be transported to Illeginni Islet on a barge and/or a landing craft vessel from Kwajalein.

Once at Illeginni Islet, personnel would unload the barge and/or vessel at the existing slip ramp located within the small harbor on the east side of the islet. The range equipment would likely include a diesel powered crane, truck, heavy-duty fork lift, portable cement mixer, backhoe/loader, and portable power generators.

Figure 2-4 Illeginni Islet and Mid-Atoll Corridor Target Areas

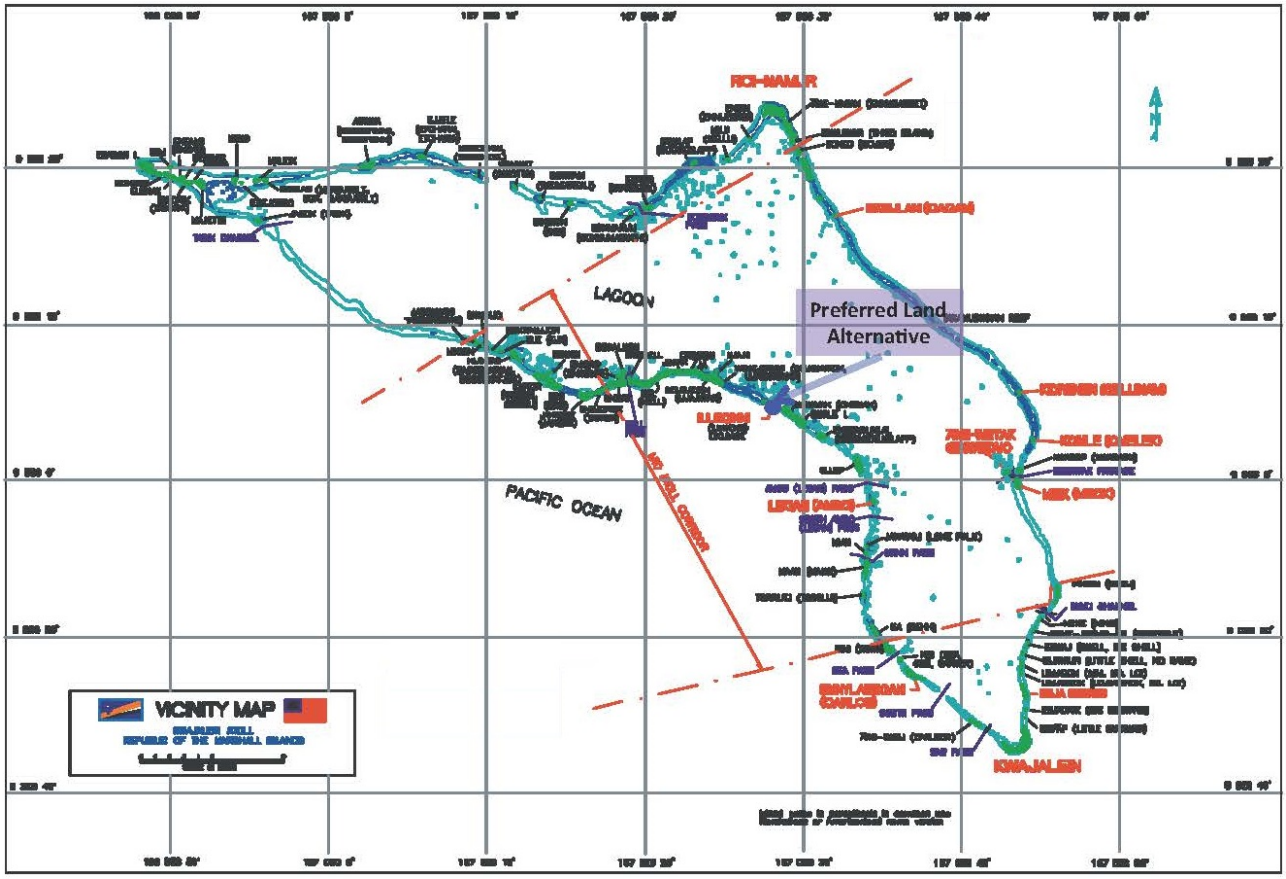


Figure 2-5 Illeginni Islet Land-Based Target Alternative

All of the equipment and materials would be moved along an existing mostly open and partially paved road to the west side of the islet. Prior to the flight test, the test support equipment and materials would be temporarily laid out over a 2-acre portion of the open area. Some of the support equipment would be erected to a height of approximately 40 feet. Shallow stakes and anchors would be placed into the ground, but generally there would be little or no soil excavation. None of the test support equipment and materials would contain propellants, ordnance, fuels, oils, pressurized gases, batteries, or other hazardous materials.

A crew of up to 15 personnel would be periodically on the islet for this effort, which could take up to 30 days to complete. During this period, personnel would be transported daily from Kwajalein Islet to Illeginni by helicopter, and/or they would be housed on a ship temporarily docked/anchored at Illeginni. At the completion of the islet preparations and setup, all or most of the range equipment would be loaded back onto the deployment vessel and transported back to Kwajalein Islet. Pending potential launch delays for the flight test, the support equipment setup could remain in place on Illeginni Islet for up to 60 days.

Within days of the flight test, several portable camera stands would be set up around the western end of Illeginni Islet to record the flight test. In addition, free-floating rafts with onboard cameras

and sensors would be temporarily placed in the lagoon and ocean waters within several hundred feet of the islet in waters no less than 10 feet deep. The rafts would be deployed from a barge or landing craft and either be anchored or maintain position using onboard battery-powered electric motors.

2.2.2 Flight Test

Payload strike impacts on Illeginni Islet would form a crater. Information concerning the HGV's energy release on impact is currently unknown. However, the HGV's impact would be less than the previous Minuteman III test impacts on Illeginni. Prior test have resulted in craters on land averaging 20 to 25 feet across and 15 feet deep, depending on the type of substrate.

2.2.3 Post-Test

Range equipment similar to that used during site preparation would be transported to Illeginni Islet on a barge and/or landing craft as part of operations to remove payload debris and temporary support equipment and materials, and to assist with cleanup and repair activities. Any craters would be filled in as previously described and repairs made to surrounding structures, as necessary. All equipment, test materials, and related debris would be transported back to Kwajalein Islet. In preparation for the AHW FT2 HTT, the USASMDC/ARSTRAT would prepare a post-test recovery/cleanup plan detailing these actions.

To minimize potential impacts on biological resources at Illeginni, the USASMDC/ARSTRAT would consult with Pacific Island Regional Offices of the USFWS and NMFS during plan development. Prior to returning the test support equipment and materials to the United States, the equipment and materials would be washed and a certified Pest Control Technician would inspect them again to ensure that no insects, animals, plants, or seeds were picked up during fielding activities.

Post-test debris recovery and cleanup operations on Illeginni Islet would cause some short-term disturbance to small areas of migratory bird habitat. However, because this is one demonstration flight test, the overall effects are considered to be minimal. A reef or shallow water impact is not part of the Proposed Action, would be unintentional, and is unlikely. Target alternatives for the HGV have been selected to minimize impacts to protected reefs and identified wildlife habitats.

2.3 BROAD OCEAN AREA ALTERNATIVE

2.3.1 Site Preparation

Existing personnel based at USAGKA would provide most of the test support at the range and within the BOA, including vessel and sensor operations. Depending on mission requirements,

other existing auxiliary land-based, sea-based, and/or aircraft-based sensors may be involved in tracking the payload and collecting data at various locations along the over-ocean flight corridors. These systems would be operated in their normal capacity in support of the flight test and/or they would monitor the missions as targets of opportunity.

Up to 16 free-floating rafts with onboard optical and/or acoustical sensors and telemetry equipment (Figure 2-3) would be placed in the vicinity of the BOA impact areas, in international waters, within a day of each test. One or two existing landing craft vessels based at USAGKA would be used to deploy all or most of the rafts. Battery-powered sensors and telemetry equipment on the rafts would then collect data from the vehicle's descent until impact.

Whales or other marine mammals may occasionally swim within the vicinity of the BOA impact areas. If ship personnel observe marine mammals during deployment of free-floating sensors, they would report such sightings to the USAGKA Environmental Management Office, the RTS Range Directorate, and the Kwajalein Test Director at the launch facility for incorporation into the launch check list for approving the launch. USAGKA aircraft pilots operating in the vicinity of the impact and test support areas near Illeginni Islet would also report any opportunistic sightings of marine mammals. To ensure the safe conduct of this flight test, RTS would implement standard range safety procedures.

2.3.2 Flight Test

The payload is expected to breakup on impact in the BOA. Little or no floating debris is expected since debris resulting from impact would consist primarily of metal components. Vehicle components would sink thousands of feet to the ocean floor. The BOA Alternative consists of two potential water impact areas. One possible water impact zone is in the deep water region approximately 20 miles southwest of Illeginni Islet. This zone would have an approximate area of 1,600 feet by 800 feet (Figure 2-5). The second possible (water) impact zone would be in the BOA along the Mid-Atoll Corridor from approximately 24 miles northeast of Kwajalein Atoll to the immediate southwest of Illeginni (Figure 2-4). Both impact zones would be sized prior to launch based on Range Safety requirements and chosen as part of the mission analysis process. Range Safety issues are always part of selecting the impact scenario.

2.3.3 Post-Test

Following impact, post-test operations would include the recovery of all free-floating raft sensors using the landing crafts or other vessels. If payload debris is found floating in the water during recovery operations, it would be collected for proper disposal in accordance with USAGKA policies and procedures. If ship personnel were to identify any injured or dead marine mammals or sea turtles during recovery operations, the personnel would report the sightings to the USAGKA

Environmental Management Office, the RTS Range Directorate, and the Kwajalein Test Director at the launch facility, which would then inform the NMFS in Honolulu. USAGKA aircraft pilots operating in the vicinity of the impact and test support areas near the impact zone would also report any opportunistic sightings of dead or injured mammals. Following all recovery operations, the landing craft and other ships would return to their homeport at Kwajalein.

2.4 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, USASMDC/ARSTRAT would not pursue the test. There would be no USASMDC/ARSTRAT role in the Office of the Secretary of Defense technology development and demonstration activity. This alternative prohibits data collection on the technologies and techniques related to hypersonic vehicle development.

2.5 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

The test objectives for the AHW FT2 HTT require capable launch facilities, unobstructed airspace, flight path of approximately 3,500 miles, and appropriate target range facilities. The Reagan Test Site on Kwajalein Atoll is unique in terms of its location, function, security and distance from candidate launch facilities. No other range facilities can compare to this location.

Launch from the Vandenberg Air Force Base provides a possible alternative to the Kodiak Launch Complex facility but also creates logistical and practical challenges for the proposed test. Several previous test events performed from this site demonstrate complex airspace clearance challenges accommodating the innumerable scheduled trans-Pacific flights proximate to the test range. Additionally, use of this facility creates prohibitive constraints.

A number of temporary, land-based telemetry sites were considered to provide range and safety system controls during the initial boost phase of the launch. These locations are generally aligned along the proposed flight path and candidate locations included Pasagshak Point (immediately west of the KLC launch facility) and near the villages of Old Harbor, Alaska, and Sand Point, Alaska. The site in Old Harbor was not carried forward in the preferred alternative analysis.

3.0 AFFECTED ENVIRONMENT

3.1 KODIAK LAUNCH COMPLEX

3.1.1 Air Quality - Kodiak Launch Complex

Air quality on Kodiak Island is defined with respect to compliance with primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) established by US Environmental Protection Agency (USEPA) and adopted by the State of Alaska. The Clean Air Act (42 USC 7401-7671q), as amended, gives USEPA the responsibility to set safe concentration levels for six criteria pollutants: particulate matter measuring less than 10 and 2.5 microns in diameter [PM-10 (inhalable particulate matter) and PM-2.5 (fine particulate matter)], sulfur dioxide, carbon monoxide, nitrogen oxides, lead, and 8-hour ozone (measured by its precursors, volatile organic compounds [VOCs] and nitrogen oxides). These criteria pollutants have been identified and adopted in the state implementation plan for Alaska.

Region of Influence

For inert pollutants (all pollutants other than ozone and its precursors: VOCs and nitrogen oxides), the region of influence is generally limited to an area extending several miles downwind from the source. Consequently, for the air quality analysis, the region of influence for project activities is the existing air shed (the geographic area responsible for emitting 75 percent of the air pollution reaching a body of water) surrounding the various sites, which encompasses Narrow Cape on the southeast side of Kodiak Island.

The region of influence for ozone may extend much farther downwind than the region of influence for inert pollutants. As the project area has no heavy industry and relatively few automobiles, ozone and its precursors are not of concern. The region of influence for ozone- depleting gases and greenhouse gas emissions is global.

Climate and Meteorology

The climate at Narrow Cape is characterized as maritime, with long, mild winters and short, cool summers. Throughout the year, the weather is affected by cool and humid air masses due to Narrow Cape's location on the Pacific Ocean. Average annual precipitation is high at approximately 77 inches. The average monthly precipitation ranges between approximately four to nine inches; highest averages typically occur between September and March.

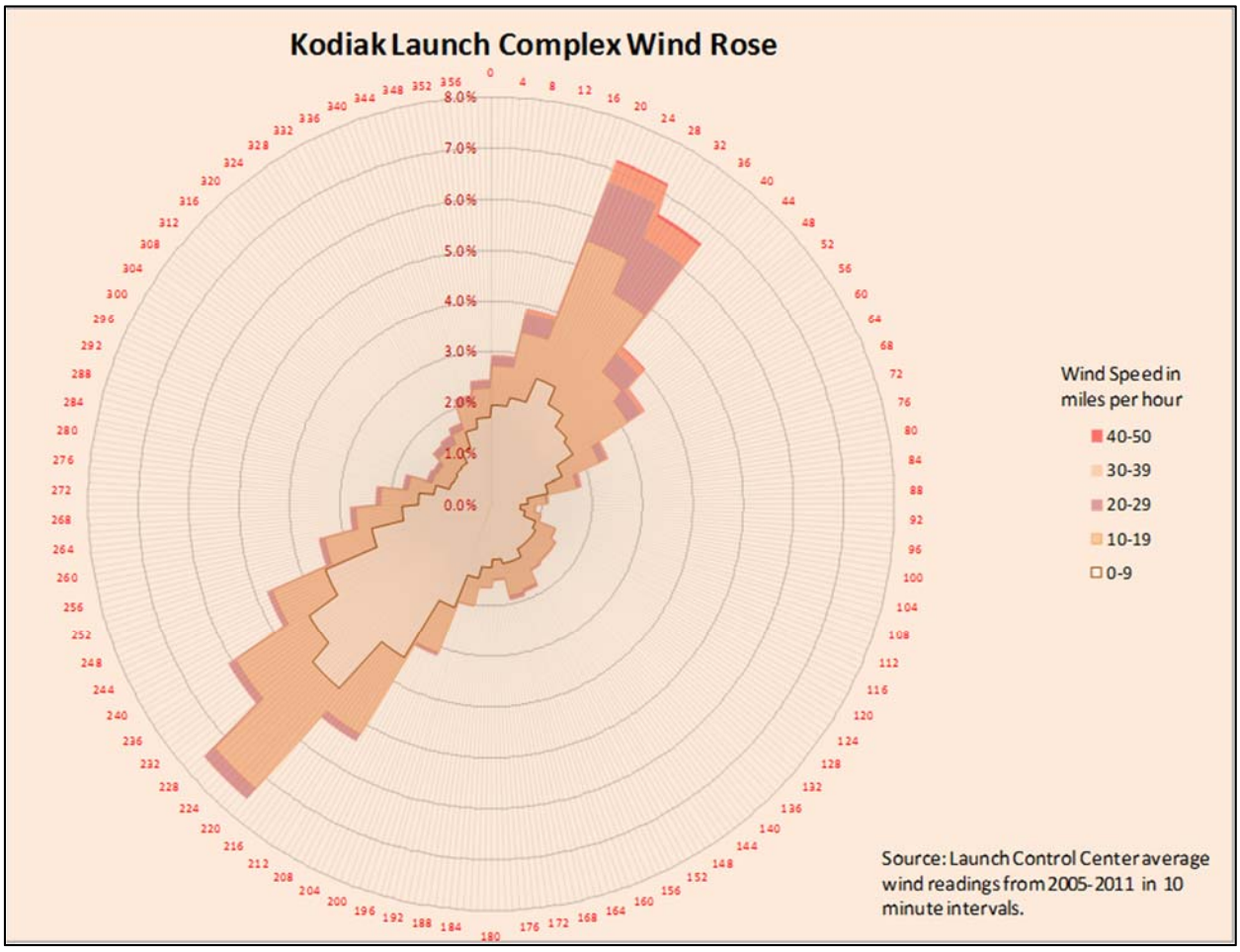
Climatic conditions at Narrow Cape, primarily wind speed/direction and precipitation, affect the dissipation of exhaust plumes from rocket launching. The average annual wind speed is 11 miles per hours with prevailing wind directions from the northeast and southwest. Wind speeds are

greatest in the winter months, between November and March and lowest May through September; however even during the summer months the mean wind speed is 5 mph or greater, which is sufficient for good dispersion for air pollutants. The average annual wind speed is 10.9 miles per hour. A visual depiction of wind direction and velocity is shown in **Error! Reference source not found.**.

Regional Air Quality

The air quality at Narrow Cape can be generally classified as unimpaired. Wind-blown volcanic dust is the primary air contaminant of Kodiak Island. The Alaska Department of Environmental Conservation Division of Air and Water Quality does not maintain air monitoring activities on the island due to minimal industrial activity and overall good air quality in the area.

Figure 3-1 Wind Rose Diagram for Kodiak Launch Complex



As an area in attainment with the National Ambient Air Quality Standards (NAAQS), Kodiak Island is classified as a class II area. Air quality control regions are classified either as class I, II,

or III to indicate the degree of air quality deterioration that State/Federal government will allow while not exceeding NAAQS. With Kodiak being designated as a class II area, a moderate change in air quality due to industrial growth would be allowed while still maintaining air quality that meets NAAQS.

The dispersion of air pollutants on Kodiak Island is based on factors such as atmospheric stability, wind speed, and surface roughness. Based on the climatology of Kodiak discussed above, the atmosphere would generally be classified as neutral (*D stability*) for the dispersion of air pollutants. *D stability* occurs during periods of high winds and overcast skies, which are common on Kodiak Island.

Existing Emission Sources

There are currently low levels of emissions at and near KLC because of the sporadic use of generators, the low volume of the vehicle traffic, and extremely sparse residential population.

The Kodiak Electric Association provides power to the existing KLC facilities. Backup diesel generations are located at five facilities at the KLC; and one portable generator is used as needed. The generators operate as backup for five hours during launches, one hour per week for testing during non-launch periods, and as needed during commercial power outages (estimated maximum total 262 hours per year). The intermittent usage contributes to annual pollutant emissions of far less than the ADEC-regulated threshold of 100 tons.

KLC is not currently required to operate under a Pre-Approved Emission Limits Permit or other Air Operating Permit.

Launch Event Emissions

The air quality impacts further evaluated are the result of the proposed action. The proposed launch of the test vehicle will utilize solid-fueled rockets which produce emissions during the launch event comprised primarily of water vapor, hydrogen chloride, carbon monoxide, carbon dioxide, nitrogen oxides (NOx), black carbon and aluminum oxide. Hydrogen chloride, NO_X, CO_2 and CO emissions are gaseous; aluminum oxide and black carbon are particulate emissions.

Exhaust plumes from launch events are concentrated within the geographic area near the launch pad (known as the *near field*) where the ground cloud forms and begins its thermal rise process. The *far field* is considered to be the geographic area where the stabilized and neutrally buoyant exhaust plume material disperses across the ground surface. Because of the rapid acceleration of the rocket, the vast bulk of rocket exhaust products are expelled above this mixing layer where they disperse quickly, reducing ground level impacts.

KLC Launch Pad 1, proposed for the AHW FT2 HTT launch, is equipped with an exhaust trench beneath the pad that contains and diverts exhaust from initial ignition and vehicle lift. The exhaust plume ground clouds created at this launch pad generally settle across a depressed, low-lying area immediately southeast of the pad.

On a larger scale; the rocket emissions of carbon dioxide and black carbon are greenhouse gases contributing to global climate change; the emissions of hydrogen chloride can cause short term, localized impacts the stratospheric ozone layer.

3.1.2 Airspace - Kodiak Launch Complex

Airspace, or that space which lies above a nation and comes under its jurisdiction, is generally viewed as unlimited. Airspace, while generally viewed as being unlimited, is finite in nature. However, it can be defined vertically and horizontally, as well as temporally, when describing its use for aviation purposes. It can be defined dimensionally by height, depth, width, and period of use (time). The Federal Aviation Administration (FAA) is charged with the overall management of airspace and has established criteria and limits for use of various sections of this airspace in accordance with procedures of the International Civil Aviation Organization (ICAO). The time dimension is a very important factor in airspace management and air traffic control.

Under Public Law 85-725, *Federal Aviation Act of 1958*, the FAA is charged with the safe and efficient use of our nation's airspace and has established certain criteria and limits to its use. The method used to provide this service is the National Airspace System. This system is "…a common network of US airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information and manpower and material."

Region of Influence

The region of influence for airspace includes the airspace over and surrounding Kodiak Island. The airspace at the KLC and the airspace over and surrounding KLC includes commercial air corridors.

The affected airspace use environment in the KLC region of influence is described below in terms of its principal attributes: controlled and uncontrolled airspace, special use airspace, en route airways and jet routes, airports and airfields, and air traffic control. There are no military training routes in the region of influence.

Controlled and Uncontrolled Airspace

The closest controlled airspace is approximately 40 kilometers (25 miles) northeast of KLC at the Kodiak Airport. Class C and Class D airspace is in effect at Kodiak Airport. Airspace above KLC up to flight level (FL) 180 (18,000 feet altitude) is uncontrolled class G airspace. Airspace above FL 180 is controlled airspace. The Anchorage Air Route Traffic Control Center (ARTCC) and the Kodiak Air Traffic Control Tower regulate air traffic in the vicinity of KLC.

Special Use Airspace

KLC coordinates launches with airspace users through the existing airspace coordination protocol among KLC, commercial aircraft carriers, and military aircraft. Launches from KLC do not affect US Air Force training exercises.

En Route Airways and Jet Routes

Commercial air corridors enter and exit Kodiak Airport to and from the west, north, and south. Routes include G2 (J604), G10, R341, B27 (J123), V506, V439, V438, and V357. These corridors are north of the Narrow Cape area, more than 24 kilometers (15 miles) from the launch area to the edge of the V506 Corridor. Although generally north of KLC, orient-bound aircraft use flexible tracks to transition to the North Pacific route system. These routes are generated based on the prevailing jet stream and their position relative to KLC may vary. These routes are not depicted on charts. Current coordination procedures minimize any potential impacts to aircraft on these routes.

Airports/Airfields

Kodiak Airport is the airport closest to KLC. It is located approximately 40 kilometers (25 miles) northeast of the launch site. It is a state operated regional airport that routinely handles daily passenger and cargo jet service and has accommodated C-141 and C-5 military aircraft.

Air Traffic Control

Air traffic in the region is managed by the Anchorage ARTCC. Control of oceanic air traffic from/to the United States is carried out from oceanic centers in Anchorage, Oakland, and New York. The Oakland Oceanic Flight Information Region is the world's largest, covering approximately 18.7 million square miles and handling over 560 flights per day.

3.1.3 Biological Resources - Kodiak Launch Complex

Native or naturalized vegetation, wildlife, and the habitats in which they occur are collectively referred to as biological resources. Existing information on plant and animal species and habitat

types in the vicinity of the proposed sites was reviewed, with special emphasis on the presence of any species listed as threatened or endangered by Federal or State agencies, to assess their sensitivity to the effects of the Proposed Action. For the purpose of discussion, biological resources have been divided into the areas of vegetation, wildlife, threatened and endangered species, and environmentally sensitive habitat. Scientific names are provided for species listed under the Endangered Species Act (ESA) and by the State of Alaska, the first time they are mentioned in the text.

Region of Influence

The region of influence is the area within the boundaries of Kodiak Launch Complex and the areas adjacent to the facility that may be affected by proposed activities (presence of additional personnel, noise from the launch, deposition of debris, and launch emissions).

Vegetation

White alder, willow species, spruce species, lupine species, and a number of grasses and other forbs are common species at the KLC. Vegetation communities within the launch complex include palustrine scrub/shrub wetlands, emergent wetlands, upland shrub, and upland shrub/forest complexes.

Threatened and Endangered Vegetation

No threatened or endangered plants are listed in proximity to the launch complex by the State of Alaska or the US Fish and Wildlife Service.

Wildlife - Birds

Kodiak Island provides habitat for 221 documented bird species and 237 species have been recorded in the Kodiak archipelago. The University of Alaska's Environment and Natural Resources Institute conducted extensive bird surveys within the KLC and adjacent on and off-shore locations in 1994, which revealed that the KLC provides seasonal habitat for approximately 143 species of terrestrial and marine-oriented birds. During the offshore surveys conducted in 1994, 38 different species were observed in June and July.

Bird that can be found at and adjoining the KLC include seasonal migrants and resident species. Migratory species that may utilize the complex include a number of passerines, wading birds, waterfowl, shorebirds, and raptors.

Some common resident species likely to found at the site include raven, gray jay, boreal chickadee, and American crow. Listed bird species do not occur within the KLC. However, several marine

oriented and listed and candidate migratory birds have the potential to occur in habitats near the KLC and the Narrow Cape. These species include Kittlitz's murrelet (*Brachyramphus brevirostris*, candidate), Short-tailed albatross (*Phoebastria albatrus,* endangered), Steller's eider (*Polysticta stelleri,* threatened) Yellow-billed loon (*Gavia adamsii,* candidate).

Wildlife - Fish and Marine Invertebrates

Several fish bearing streams occur within the KLC boundary with several containing anadromous fish populations and associated Essential Fish Habitat (EFH) for these. Two fish-bearing lakes, West and East Twin Lakes occur within the KLC as well and are stocked annually by the Alaska Department of Fish and Game with rainbow trout (*Oncorynchus mykiss*). These lakes are also likely to contain resident fish species such as stickleback (*Gasterosteus aculeatus*) and Dolly Varden (*Salvelinus malma*). Near shore marine habitats are likely to contain a number of ground fish species, baitfish, bivalves, starfish species, sea cucumbers, gastropods, crabs, jellyfish, and cephalopods.

Essential Fish Habitat

Essential Fish Habitat (EFH) surrounds Kodiak Island and the KLC in all marine waters. EFH also includes those waters containing anadromous fish species. EFH is designated in the Gulf of Alaska and near shore areas for five species of salmon (chum, coho, Chinook, pink, and sockeye), a minimum of nine bottom fish species, and squid (NMFS 2013).

Wildlife - Mammals

A number of land mammals are found within and adjacent to the boundaries of the KLC. A species of bat, several species of mustelids (weasels), brown bear, American bison, numerous species of rodents, Sitka black-tailed deer, mountain goat, and snowshoe hare.

In addition to land mammals, a number of marine mammal species are likely to occur in the waters surrounding the KLC and the Narrow Cape. Pinnipeds found in the area include harbor seal (*Phoca vitulina*) and Steller's sea lion (*Eumetopias jubatus*). Northern sea otter (*Enhydra lutris*) also have the potential to occur in the marine waters surrounding the launch facility. Gray, sei, humpback, and fin whales are the most commonly recorded cetaceans observed within 12 nm of the Narrow Cape coastline.

Steller's sea lion is listed as an endangered species and the northern sea otter is listed as threatened. In addition, Critical Habitat for both of these species includes waters surrounding KLC and the Narrow Cape. The sei, humpback, and fin whale(s) are all listed as endangered.

3.1.4 Hazardous Materials and Waste - Kodiak Launch Complex

Hazardous material are substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Toxic Substances Control Act (TSCA), and the Hazardous Materials Transportation act (HMTA). In general hazardous material include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare, or to the environment, when released. The FAA requires that each commercial launch site and each launch operation have a safety review that includes a complete disclosure of each hazardous material in the ground safety analyses report, as well as a hazardous materials management plan (FAA, 2009).

Management of hazardous waste must comply with the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA). In Alaska, the EPA administers RCRA, which requires that hazardous wastes be treated, stored, and disposed to minimize the present and future threat to human health and the environment.

Hazardous Materials Management

Hazardous materials use, storage, and disposal are managed in accordance with the KLC Safety Policy, the KLC Emergency Response Plan, the KLC General Compliance Plan for Emergency Planning and Community Right to Know Act, AAC's Hazardous Communication Program, the Kodiak Area Emergency Operation Plan, and applicable state and Federal environmental laws in such a way as to minimize impacts to the environment. Hazardous materials present at KLC are listed in the AAC Hazardous Communication Program. All hazardous waste is removed at the end of the mission by the launch vehicle provider. Additionally, the KLC maintains a Spill Prevention, Control, and Countermeasure Plan covering the fuel/oil storage facilities.

The KLC Vice-President and General Manager serve as the point of contact for all matters pertaining to hazardous materials at KLC; AAC standard operating procedures require prior notification before the arrival of any hazardous materials. All contractors provide hazardous materials information (Safety Data Sheets) for hazardous chemicals brought to the facility.

The KLC infrastructure currently has 18,000 gallons of capacity for petroleum products (gasoline, diesel fuel and lubricating fluids).

AAC operates the KLC as a Conditionally Exempt Small Quantity Generator (CESQG). With this designation, KLC is limited to no more than 220 pounds of hazardous waste per month. This classification is applicable for both medium-lift and small-lift launches from KLC.

Pollution Prevention

Pollution prevention, waste minimization and recycling management practices and procedures are defined in the facility Spill Prevention, Control, and Countermeasure Plan, Emergency Response Plan and Contamination Control Procedures.

Solid Waste Management

Solid Wastes of a non-hazardous nature are containerized at the KLC and periodically picked up by approved carriers and disposed of at the Kodiak Island Borough Landfill.

Existing Environmental Contamination

No National Priorities List sites are identified for the Narrow Cape area in USEPA CERCLIS database.

A search of the ADEC Contaminated Sites Database did not reveal any open or closed sites with known environmental contamination near existing KLC installations. The nearest "Active" site is located at the decommissioned USCG LORAN-C Station on Narrow Cape. Based on the ADEC site cleanup chronology, there were two known releases from an underground storage tank at the facility; one spill of over 20,000 gallons of diesel fuel in 1982 and another approximately 8,000 gallons of diesel in 1987. The contamination was confirmed in 1995, and a site characterization performed in 1997. Approximately 402 tons of contaminated soils were excavated and treated in 2002. Institutional controls are implemented for the contamination remaining at the site.

3.1.5 Health and Safety - Kodiak Launch Complex

The goal of KLC's safety program is to protect the public, range participants, and workers from any hazards in preparation for, during, and after the proposed launch. This goal includes protecting the following:

- The well-being, safety, and health of workers—Workers are considered to be persons directly involved with the operation producing the effect or who are physically present at the operational site.
- The well-being, safety, and health of members of the public—Members of the public are considered to be persons not physically present at the location of the operation, including workers at nearby locations who are not involved in the operation and the off-base population. Also included within this category are hazards to equipment and structures.

Existing safety policies and standard operating procedures in place for general operations KLC and launch-specific safety plans have been developed that meet or exceed the requirements of the RCC Common Risk Criteria for National Test Ranges and Standard 321-02 (RCC 321-02),

AFSCMAN 2004 and FAA Notice of Proposed Rulemaking. All potentially hazardous activities associated with the proposed AHW FT2 HTT launch, including ordnance safety, pre-launch and hazardous operations control, ordnance handling and temporary storage, fuel handling and temporary storage, and launch pad operations; are addressed in the launch specific safety policies.

The proposed actions will be conducted under strict adherence to all safety policies and procedures developed for the action, and will cover ground safety, flight safety, range clearance and surveillance, sea-surface area clearance and surveillance, and commercial air traffic control.

Region of Influence

For the proposed AHW FT2 HTT, KLC range safety and mission management personnel will work jointly to establish potential hazard areas over ground and water to assure that the proposed action will not endanger life or property. The remote nature of the KLC eliminates many of these potential hazards to population areas.

The size of the evacuation area has been determined by the size and flight characteristics of the launch vehicle and anticipated flight profile, and standard explosive safety rules. They have been reviewed and fine-tuned based upon the potential variability of launch activities, computation and review of flight trajectories, launch azimuths, kinetic energy intercepts, debris impact areas, and hazard area dimensions. Exclusion zones are established to eliminate unacceptable risks to the public and launch support personnel.

KLC will work with state and federal agencies to publish NOTAMS and NOTMARS, coordinate security closures of lands and waters around KLC and with the USCG, FAA, and the ADOTPF for the region of influence. An imminent launch will be announced on the local radio as well as in the newspaper.

The KLC range organization and mission support personnel will monitor the region of influence before and during the test in both the Ground Hazard Area and Launch Hazard Areas over water. This includes the hazard area outside the island, where post-boost vehicle fragments sometimes impact. Before a launch is allowed to proceed, the projected flight path and region of influence will be confirmed and cleared by using surveillance from aircraft and ships in the area, and radar data.

Affected Environment

Safe operating procedures are followed in accordance with DoD Standard 6055.9. A hazard potential is present during prelaunch transport, prelaunch processing, and launch of rockets due to the significant amount of propellant contained in the rocket engines. The exposure to launch mishaps is greatest within the early portions of the flight after launch. Measures are currently in

place to limit the number of personnel involved in launch operations include OSHA and DOT regulations and USAF procedures (for transporting hazardous materials), and DoD procedures (for handling explosives, and the DoD Range Safety program for the processing and launch of rockets).

Missile Flight Analysis

Missile flight safety includes analyses of flight performance capabilities and limitations, of hazards inherent in operation and destruct systems, and of the electronic characteristics of the technology and instrumentation.

Ground Safety

On arrival at KLC, support equipment and material hazards will be placed in secure storage until assembly and launch preparations. ESQDs are established around ordnance storage and missile (rocket) assembly buildings. Access to storage and support facility is limited to trained and authorized mission critical personnel.

Pasagshak Point Road will be closed at the site boundary (the only road access to KLC) and monitored during launch day to ensure that no unauthorized personnel enter the ground hazard area. If the safety zone is compromised, the launch will be delayed until the area is confirmed clear.

Ordnance Management and Safety

Rocket motors and other ordnance components will be stored at specialized facilities and then taken to the processing facility for assembly, and ultimately moved to the designated launch site.

The transportation of hazardous materials to the launch facility will be covered under a separate transportation safety plan. Onsite ordnance storage and handling procedures follow the established facility safety plans.

Ocean Area Clearance

The Launch Hazard Area (LHA) over the Gulf of Alaska and the Pacific Ocean is established based on the launch vehicle and potential associated hazards. The launch flight termination line is intended to minimize potential adverse effects on populated areas. Prelaunch notifications to aviators and mariners will be issued 24 hours before launches in the ocean and flight areas defined, and the areas will be actively monitored prior to an imminent launch.

KLC will publish NOTAMS and NOTMARS, coordinate security closures of lands and waters around KLC and with the USCG, FAA, and the Alaska Department of Transportation and Public Facilities. Imminent launches will be announced of the local radio as well as in the newspaper.

Transportation Safety

Rocket components, including the propellant and explosives, are transported in Department of Transportation and military designed and approved shipping containers. Where necessary, Explosive Safety Quantity Distance (ESQDs) will be established at transshipping sites. The transportation of hazardous materials to KLC will be covered under a separate transportation safety plan.

During the arrival of hazardous components, KLC will manage the safety aspects for handling and storage of rocket components (e.g., solid propellant boosters), the booster and rocket components, explosives, and other hazardous materials.

Fire and Crash Safety

KLC has a fire truck and a 250-gal pumper mounted on a 1-ton truck chassis to fight brush fires that may occur during a launch. The KLC water system includes a 150,000-gallon storage tank that can be used to supply fire-fighting operations. The KLC also has an ambulance to transport injured patients. During missions, Emergency Medical Technicians are present at the KLC with the oversight of Northwest Medical. During launch day operations an EMT 3 is in attendance at the KLC.

3.1.6 Noise - Kodiak Launch Complex

Region of Influence

The region of influence for noise analysis is the area within and surrounding the KLC and the Narrow Cape in which humans and wildlife may suffer annoyance or disturbance from noise sources at the facility. This would include the Narrow Cape, KLC, Pasagshak Community, and surrounding marine shorelines associated with Ugak Island and the Narrow Cape. Local noise sensitive areas include a private property and structures that may be occasionally used as a church camp, the Burton Ranch, several areas on Narrow Cape used for recreation, Pasagshak State Recreation Area, and private homes along Pasagshak.

Affected Environment

Primary sources of noise on KLC include range operations and rocket launches.

Range operations include training and research and development activities support. Ambient noise levels from natural sources include wind, surf, and birds. Range operations that may impact the sound environment include, but are not limited to, power generation, training and research and development activities support, maintenance operations, and construction or renovation. The

activity with the most noticeable sound events is the launch of rockets. These launches result in high-intensity, short-duration sound events.

In addition to the noise from the rocket engine, launch vehicles can also generate sonic booms during flight. A sonic boom is a sound that resembles rolling thunder, and is produced by a shock wave that forms at the nose and at the exhaust plume of a missile that is traveling faster than the speed of sound. Shock waves that form at the nose and at the exhaust plume of a missile travelling faster than the speed of sound produce an audible sonic boom when they reach the ground. The sonic boom occurs some distance downrange of the launch site. The up range boundary of the sonic boom carpet forms a parabola pointing downrange. Most of the region subjected to any sonic boom from launches at KLC is the surface of the ocean. Thus, land based population centers are not affected.

3.1.7 Water Resources - Kodiak Launch Complex

This section describes the existing water resource conditions at the proposed sites. Water resources include surface water, groundwater, water quality, and flood hazard areas.

Water resources include those aspects of the natural environment related to the availability and characteristics of water. For the purposes of this document, water resources can be divided into three main sections: surface water, groundwater, and flood hazard areas. Surface water includes discussions of runoff, changes to surface drainage, and general surface water quality. Groundwater discussions focus on aquifer characteristics, general groundwater quality and water supply. Flood hazard area discussions center on floodplains. Where practicable, water resources are described quantitatively (volume, mineral concentrations, salinity, etc.); otherwise they are described qualitatively (good, poor, etc.) when necessary.

Region of Influence

The region of influence for KLC includes the area within and surrounding the KLC property boundaries, including KLC and the Narrow Cape vicinity.

Surface Water

The surface water within the KLC boundary is in the streams and lakes that drain the KLC and adjacent lands in addition to wetlands. These waters include portions of six unnamed streams, two freshwater lakes (East and West Twin Lakes), two saltwater lagoons (Triple Lakes and Barry Lagoon), and extensive emergent, shrub/scrub, and forested wetlands.

Groundwater

Extensive shallow groundwater resources occur across the complex and surrounding lands. Groundwater is the primary source of local consumable water.

Flood Hazard Areas

No flood hazards are designated on the KLC. Marine influenced and low elevation lands are subject to high tides, tsunamis, and storm surges.

3.2 US ARMY GARRISON KWAJALEIN ATOLL

3.2.1 Air Quality - US Army Garrison Kwajalein Atoll

Region of Influence

For the air quality analysis, the region of influence for the proposed action and alternatives is limited to Kwajalein and Illeginni.

Climate and Meteorology

While available climatological information is specific to Kwajalein, the other islands in the atoll have very similar climates. The average monthly temperatures on Kwajalein range from 80 to 85 degrees Fahrenheit (°F), depending on the season.

The average annual precipitation is 101 inches, 75 percent of which is recorded from mid-May to mid-December (the rainy season). During this time, light, easterly winds and frequent moderate to heavy showers prevail. During the drier season, light showers of short duration occur, and cloud cover is at a minimum. The relative humidity is uniformly high throughout the year, with values almost always between 70 and 85 percent.

Northeasterly trade winds ranging from 9 to 16 miles per hour are dominant during most of the year. The summer months can bring relatively calm conditions. Typhoons occasionally occur at Kwajalein Atoll; however, the atoll is considered to be outside the main areas of typhoon occurrence in the Western Pacific.

Regional Air Quality

The air quality at the US Army Kwajalein Atoll can be generally classified as unimpaired. If USAGKA was located in the United States, it would be considered an Attainment Area for the Clean Air Act criteria pollutants. Under the USAGKA Environmental Standards 12th Edition (2011), the USAGKA ambient air quality standards shall not exceed 80% of the US standards and

all significant stationary emission sources shall be governed by a Document of Environmental Protection. Table 3-1 provides ambient air quality standards for the installation, and presents the major source emissions thresholds for criteria air pollutants.

Table 3-1 USAGKA Ambient Air Quality Standards

Pollutant	Averaging Period	USAGKA Ambient Standard ($\mu g/m^3$)	USAGKA Increment Degradation Standard ($\mu g/m^3$)
Carbon Monoxide (CO)	8-hour	8,000 $\mu g/m^3$ (7.2 ppm)	2,500
	1-hour	32,000 $\mu g/m^3$ (28 ppm)	10,000
Nitrogen Oxides (NOx)	Annual	80 $\mu g/m^3$ (0.04 ppm)	25
Ozone (O_3)	8-hour	120 $\mu g/m^3$ (0.06 ppm)	37.5
Sulfur Dioxide (SOx)	3-hour	1,040 $\mu g/m^3$ (0.05 ppm)	325
	24-hour	292 $\mu g/m^3$	91
	Annual	64 $\mu g/m^3$	20
Lead (Pb)	3 months	0.12 $\mu g/m^3$	0.375
Particulate Matter (PM-2.5)	24-hour	28 $\mu g/m^3$	8.75
	Annual	12 $\mu g/m^3$	3.8
Particulate Matter (PM-10)	24-hour	120 $\mu g/m^3$	37.5

Source: USAKA Environmental Standards, 12th Edition, 2011, Table 3-1.6.1
$\mu g/m^3$ = micrograms per cubic meter
PM-2.5 = particulate matter equal to or less than 2.5 microns in size
PM-10 = particulate matter equal to or less than 10 microns in size (also called respirable or suspended particulate)
ppm = parts per million

Table 3-2 USAGKA Air Pollutant Thresholds for Major Stationary Sources

Pollutant	Threshold
Carbon Monoxide	100 tons per year (tpy)
Nitrogen Oxides	40 tpy
Sulfur Dioxide	40 tpy
Ozone	40 tpy of volatile organic compounds
Particulate Matter	25 tpy of particulate matter emissions
	15 tpy of PM-10 emissions
	10 tpy of PM-2.5 emissions

Source: USAKA Environmental Standards, 12th Edition, 2011, Table 3-1.5.2

3.2.2 Airspace - US Army Garrison Kwajalein Atoll

Region of Influence

The region of influence for airspace at USAGKA includes the airspace over and surrounding the debris containment corridor, potential regional radiation hazard areas, and airspace over and surrounding Kwajalein and Illeginni.

Controlled and Uncontrolled Airspace

USAGKA is located in international airspace. It is also considered within Class C airspace. The ceiling of Class C airspace is 4,000 feet above ground level. The dimensions of the airspace are contained within two circular areas, the first 5 nautical miles from the center of the airfield and the second 10 nautical miles. Airspace between these circular areas shall not extend lower than 1,200 feet above ground level.

The procedures of the ICAO outlined in ICAO Document 4444, Rules of the Air and Air Traffic Services, are followed (International Civil Aviation Organization, 1996; 1997). ICAO Document 4444 is the equivalent air traffic control manual to the FAA Handbook 7110.65, Air Traffic Control. The ICAO is not an active air traffic control agency. The ICAO has no authority to allow aircraft into a particular sovereign nation's Flight Information Region or Air Defense Identification Zone and does not set international boundaries for air traffic control purposes. The ICAO is a specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transportation.

The FAA acts as the US agent for aeronautical information to the ICAO, and air traffic in the Pacific region of influence is managed by the Oakland ARTCC in its Oceanic Control-6 Sector, the boundaries of which are shown in Figure 3-2.

Special Use Airspace

There is no special use airspace in the region of influence. USAGKA issues NOTAMs prior to missile launch activities in the region that could impact aircraft.

En Route Airways and Jet Routes

Although relatively remote from the majority of jet routes that cross the Pacific, USAGKA and vicinity have two jet routes above Kwajalein. An accounting of the number of flights using each jet route is not maintained. Propeller driven aircraft also carry commercial traffic between the

various islands of the RMI, particularly between the Marshall Islands International Airport at Majuro and Bucholz Army Airfield on Kwajalein.

Airports/Airfields

Since World War II, Bucholz Army Airfield on Kwajalein has provided passenger and cargo flight services for military and civilian operators. Currently, the airfield supports approximately 3,000 flights per year, which is relatively low density compared to most military airfields in the United States. The majority of these flights were daily intra-atoll fixed wing and rotary wing aircraft operated by USAGKA and support contractors. Commercial flights are much less frequent. Dyess Army Airfield on Roi-Namur provides service to a variety of aircraft and helicopters.

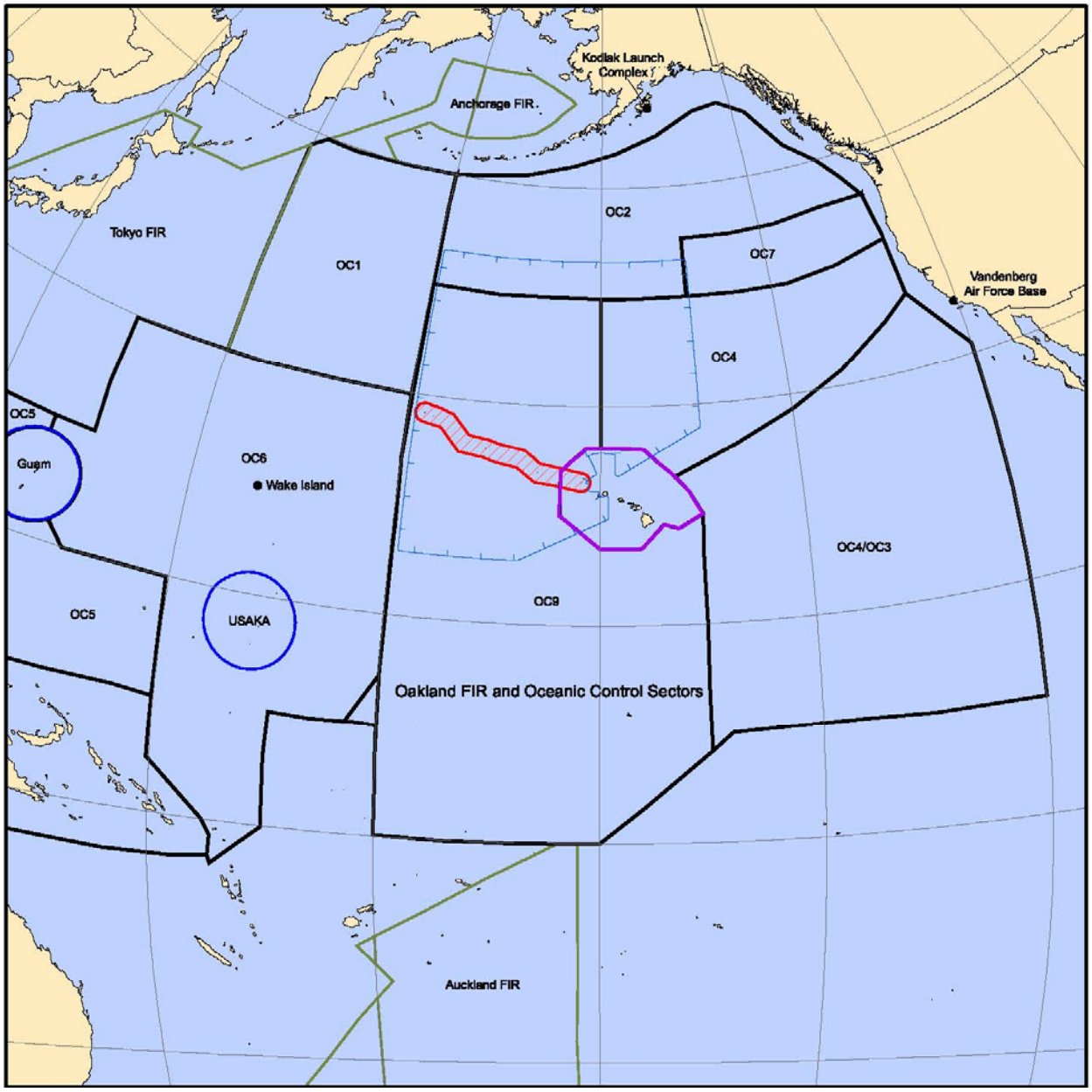
Air Traffic Control

Bucholz Airfield will support up to and including C5A military aircraft. A fully operational FAA tower, a TACAN instrument approach and an ADF/DME approach support transient aircraft in and out of the airfield. Aircraft flying into and out of Bucholz AAF will operate in Class D airspace during the hours of 1730-0930Z (UTC+12). Crash and Fire Rescue assets are available 24 hours per day.

Direct flights into Dyess Airfield on Rio are not authorized. Electromagnetic radiation exists 24 hours daily within a 10 nautical mile radius of the airfield and from the surface to 50,000 feet. Pilots should consult the FLIP Planning AP/3, Oakland FIR, and Flight Hazard prior to transiting this area. Over-flights of Dyess AAF are not authorized.

Dyess Airfield will support up to and including C130 military aircraft. Bucholz Tower controls landings and take-offs. Dyess Fire Department provides an advisory information service only. Aircraft flying into and out of Dyess Airfield will operate in Class D airspace during the hours of 170-0930Z (UTC+12). Crash and Fire Rescue assets are available 24 hours per day.

Figure 3-2 Pacific Region Air Traffic Control Areas



3.2.3 Biological Resources - US Army Garrison Kwajalein Atoll

Illeginni is located on the west-central side of the atoll and has 31 acres of land area with several buildings (some abandoned), towers, roads, a helipad, and a dredged harbor area. Illeginni also has terrestrial and marine habitats of significant biological importance, as defined in the UES. Figure 3-3 shows the categories of biological resources observed during recent surveys around Illeginni and the lagoon.

Vegetation

Illeginni is covered with mainly grassy lawns surrounding buildings and other facilities, and four relatively large patches of native vegetation (see Figure 3-3). The native vegetation consists of one patch of herbaceous strand and several patches of littoral (near shore) forest. The forest areas are composed primarily of *Pisonia*, *Intsia*, *Tournefortia*, and *Guettarda* trees. Some littoral shrubland can also be found mainly on the western end of Illeginni.

Wildlife

Various non-listed species of coral, mollusks, and other invertebrates (e.g., sea stars, sea urchins, and crinoids) have been identified within the waters surrounding Illeginni. Some of the reef fish species observed in the area include surgeonfishes, snappers, groupers, grey reef sharks, and parrotfishes. Two adult squaretail coralgroupers *(Plectropomus areolatus),* two adult lyretail groupers *(Variola louti),* and an adult humphead wrasse (*Cheilinus undulatus)* were observed during previous biological inventories.

A number of protected migratory seabirds and shorebirds have been seen breeding, roosting, or foraging on Illeginni. Between 1998 and 2004, biological inventories conducted on Illeginni by the USFWS and NMFS have identified at least 14 bird species, including the black noddy, pacific golden plover, wandering tattler, and ruddy turnstone. Although these bird species are protected under the MBTA, none of them are listed as threatened or endangered. Surveys have shown shorebirds to use the managed vegetation throughout Illeginni's interior (Figure 3-3).

Pooled water on the helipad attracts both wintering shorebirds and some seabirds (e.g., terns, plovers, and curlews). White terns have been observed in trees at the northwest corner and southwest quadrant of Illeginni. The shoreline embankment and exposed inner reef provides a roosting habitat for great crested terns and black-naped terns. Concentrations of federally protected migratory shorebirds and seabirds have also been seen in the littoral forest on the southeast side of Illeginni, which supports the second largest nesting colony of black noddies recorded during previous wildlife surveys and habitat mapping (Figure 3-3); 130 active nests were identified in 2004. There are also signs of black-naped tern nesting on the western tip of Illeginni.

Terrestrial species observed on Illeginni include rats and three species of ants. These non-native species were accidentally introduced to Illeginni some years earlier. The azure-tailed skink and another big, dark, lateral-striped skink were observed in 2008.

Threatened and Endangered Wildlife and Other Protected Species

The Kwajalein Atoll lagoon, reefs, and surrounding ocean waters are home to a number of threatened, endangered, and other protected species. The marine environment surrounding

Illeginni supports a community of corals, fish, and invertebrates including but not limited to the following protected species: coral (Candidate species: *Acropora globiceps, A. horrida*, *A. paniculata, A. vaughani, A. verweyi*, blue coral [*Heliopora coerulea*] and pore coral [*Montipora caliculata*]); mollusks, such as giant clams (including *Tridacna maxima* and *Hippopus hippopus*) and the top-shell snail (*Trochus niloticus*); and sponges. Figure 3-3 shows areas where various protected species can be found at Illeginni.

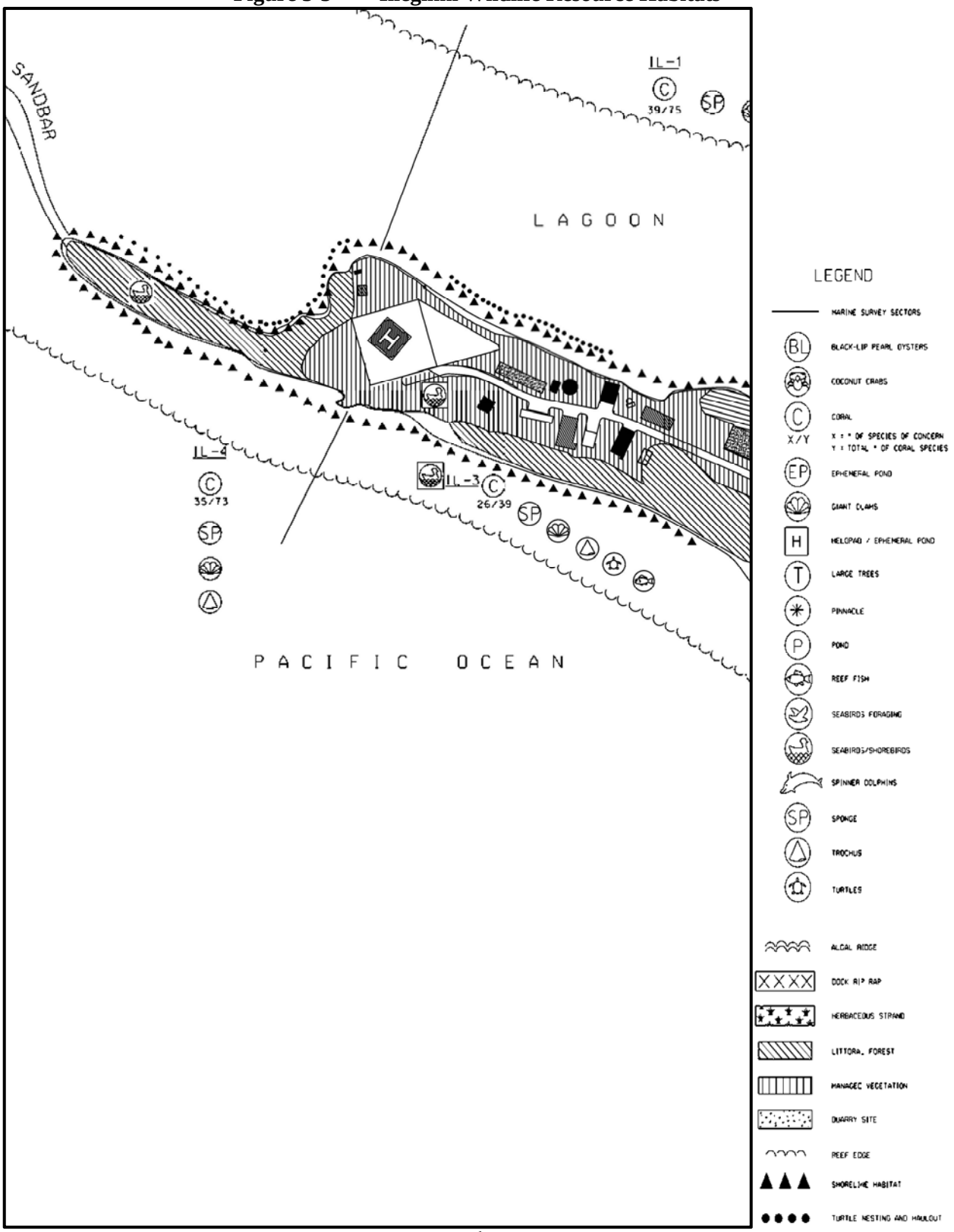
Based on prior surveys conducted around Illeginni Islet, marine life in general is abundant and diverse on the ocean side south of Illeginni. In general, the reef crests and slopes of Illeginni are species rich with high organism abundances. Coral diversity on reef flats varies with distance from shore and depth.

Towards the southwestern side, the water column was previously shown to be moderately turbid. Further west and south of the helipad, there is a marked degradation of the coral cover. During surveys conducted in 2000, coral mortality in this area was observed to an approximate depth of 82 feet. Live coral cover appeared to be low, and the benthic substrate was dominated by rubble. Severe physical impacts in this area have disrupted the coral community landward of the reef crest. In addition to the water column being turbid in this area, reef rubble and metal fragments from legacy iron piers and dump sites widely cover the benthic substrate.

Endangered marine mammals that may occur in and around Kwajalein Atoll include some of the same baleen and toothed whales found off the Hawaiian Islands (e.g., the blue whale, finback whale, humpback whale, and sperm whale). These are open-water, widely distributed species and are not likely to be found in the lagoon area. On the ocean side of the atoll, marine mammals have been seen and/or heard (underwater clicking sounds) in the vicinity of Illeginni. Sightings and indications of whales include:

- In 2000, a pod of approximately 12 endangered sperm whales was seen a few miles southeast of Illeginni. This pod of sperm whales has been seen consistently to the west of Illeginni, on the ocean side, several hundred yards offshore. Because calves have been seen with females, the group could represent a “nursery pod” of related females and their young, but this has not been verified
- Underwater clicking was heard in this area during the 2004 survey, possibly originating from nearby sperm whales, no cetaceans were observed
- In 2006, two sperm whales and eight pilot whales were observed in the area
- In April 2009, an estimated four sperm whales were sighted a few miles southeast of Illeginni
- On July 2, 2009 a pod of 28 sperm whales, including a calf, was seen between Legan and Illeginni on the ocean side

Figure 3-3 Illeginni Wildlife Resource Habitats



Source: USAGKA Environmental Standards, 12th Edition, 2011, Figure 3-4H.7

- On November 20, 2010 at about 4:00 p.m., biologists from the USFWS and NMFS observed a large adult whale or whales, approximately 2 to 3 miles due west of Illeginni in the BOA known as the Kwajalein Bight. At least one and possibly two large whales were observed to fully breach the surface, resulting in two large splashes

Several threatened and endangered species of sea turtles can be found in the lagoon and ocean waters surrounding Illeginni. These include the hawksbill sea turtle and green sea turtle. As shown in Figure 3-3, suitable sea turtle haul-out/nesting habitat exists along the shoreline northwest and east of the helipad on the lagoon side of Illeginni. In 1996, sea turtle nesting pits were found on the northwestern tip of Illeginni. No pits were observed during the 1998, 2000, 2002, or 2004 biological inventories; however, the habitat still appeared suitable for successful nesting. On a few occasions, adult hawksbill and green sea turtles have been seen in the waters offshore. A hawksbill sea turtle was observed in the lagoon just north of Illeginni in 2002 and 2004, while an adult green sea turtle was seen on the seaward side in 1996.

The marine environment surrounding Illeginni supports a community of corals, fish, and invertebrates including the following protected species: mollusks, such as giant clams (including *Tridacna maxima* and *Hippopus hippopus*) and top-shell snail (*Trochus niloticus*); and coral (two Candidate species: Blue Coral [*Heliopora coerulea*] and Pore Coral [*Montipora caliculata]*).

Trochus niloticus and the coral species are described above. Based on prior surveys conducted around Illeginni, in general the reef crests and slopes of Illeginni are species rich with high organism abundances. Coral diversity on reef flats varies with distance from shore and depth. Figure 3-3 shows areas where various protected species can be found at Illeginni.

Environmentally Sensitive and Critical Habitat

No designated essential fish habitat is identified for the Marshall Islands. However, 250 species of reef fish are located in the atolls of the Marshall Islands. Because food cultivation on the islands is limited, fish and other sea life are of important dietary value to the Marshallese people. In an effort to protect the fisheries, the mutual efforts of the multilateral fisheries agreement between the United States and South Pacific island governments, including the Marshall Islands, resulted in adoption of a treaty (United Nations Agreement on Highly Migratory Fish Stocks and Straddling Fish Stocks) that promotes the long-term sustainable use of highly migratory species, such as tuna, by balancing the interests of coastal states and states whose vessels fish on the high seas.

Illeginni has marine and terrestrial habitats of significant biological importance, as defined in the UES. The terrestrial habitats of significant importance include the mixed broadleaf (littoral) forest, seabird colonies, and the shorebird sites around the island. The marine habitats considered biologically important are the lagoon-facing reef slope and reef flat, the inter-island reef flat, the

lagoon floor, the ocean-facing reef slope and reef flat, the intertidal zone, and the reef pass. All of these habitats are considered important because of the presence or possible presence of protected species.

Surveys have shown shorebirds to use the managed vegetation throughout Illeginni's interior. Pooled water on the helipad attracts both wintering shorebirds and some seabirds. Littoral forests to the west and east of the Illeginni helipad serve as habitat for a variety of federally protected migratory birds, including shorebirds and seabirds. White terns have been observed in trees at the northwest corner and southwest quadrant of Illeginni (Figure 3-3). The shoreline embankment and exposed inner reef provides a roosting habitat for great crested terns and black-naped terns. Seabirds have been seen concentrated in the southeast quadrant where the littoral forest supports the second-largest nesting colony of black noddies in the surveyed islands; nearly 150 nests were identified in 2000. There are also signs of black-naped tern nesting on the western tip of Illeginni.

Suitable sea turtle haul-out/nesting habitat exists along the shoreline northwest and east of the helipad on the lagoon side of Illeginni. Sea turtle nest pits have not been observed near the western end of Illeginni since 1996.

3.2.4 Cultural Resources - US Army Garrison Kwajalein Atoll

Region of Influence

The region of influence is the area on Illeginni Islet where the test article could impact.

Affected Environment

Buildings and most other facilities at Illeginni are primarily in the central and eastern portions of the islet. Most of them are no longer used and have been abandoned in place. Previous investigations identified almost all of the buildings as having potential eligibility for nomination to the U.S. National Register of Historic Places because of their Cold War-era historic importance; however, it was determined at the time that U.S. eligibility criteria did apply at USAGKA.

Correspondence from the RMI Historic Preservation Officer in 2004 stated that properties under the Anti-Ballistic Missile Cold War context did not meet any of the RMI criteria for eligibility for the RMI National Register of Historic Places. Recent correspondence from the RMI Historic Preservation Officer now suggests that Cold War-era structures under the Anti-Ballistic Missile context (i.e., SPRINT and SPARTAN launch facilities) should be considered eligible under the RMI criteria. No guidance has yet been offered under which criteria they are eligible.

Any buried traditional or prehistoric remains that might have survived the construction of the remote launch site on the east side of the islet and subsequent use of the islet as a reentry vehicle

impact site are probably buried under significant amounts of modern fill. Limited subsurface testing on the islet found severe disturbance to the original land surface, especially along the lagoon-facing shoreline; most of which had been bulldozed. Some relatively young stands of vegetation exist. No indigenous cultural materials or evidence of subsurface deposits has been found. Midden-associated (refuse heap) charcoal that was observed along the lagoon shoreline is most likely a modern intrusion.

3.2.5 Hazardous Materials and Waste - US Army Garrison Kwajalein Atoll

The UES references the U.S. DOT definition of a hazardous material which is a substance or material that is capable of posing an unreasonable risk to health, safety, or property when transported in commerce and has been so designated. Hazardous waste is further defined as any solid waste not specifically excluded which meets specified concentrations of chemical constituents or has certain toxicity, ignitability, corrosivity, or reactivity characteristics.

Pollution prevention, recycling, and waste minimization activities are performed in accordance with the UES and established contractor procedures in place at the installation.

Region of Influence

The region of influence for the proposed action includes locations where mission-related hazardous materials and wastes are stored, handled and disposed (i.e., Kwajalein and Illeginni).

Hazardous Materials Management

Hazardous materials at USAGKA are used in a variety of operations, including facility infrastructure support, supply, transportation, power generation, medical, radar, and test. Hazardous materials include various cleaning solvents, paints, cleaning fluids, compressed gases, refrigerants, pesticides, motor fuels and other petroleum products, and other materials.

These material are shipped to USAGKA by ship or by air. Upon arrival at USAGKA, hazardous materials are distributed, as needed, to various satellite supply facilities, from which they are distributed to the individual users. Distribution is coordinated through the base supply system; however, the issue of such materials requires prior authorization and coordination with the USAGKA and base operations contractor to prevent use unapproved of hazardous materials.

Per the UES requirements, activity-specific Hazardous Materials Procedures are submitted to the Commander, USAGKA for approval within 15 days of receipt of any hazardous material or before use, whichever comes first. Hazardous materials to be used by organizations on the test range and its facilities are under the direct control of the user organization, which is responsible for ensuring that these materials are stored and used in accordance with UES requirements. The use of all

hazardous materials is subject to ongoing inspection by USAGKA environmental compliance and safety offices to ensure the safe use of all materials. The majority of these materials are consumed in operational processes.

Hazardous Waste Management

Hazardous handling and disposal activities are closely monitored by the USAGKA Environmental Office in accordance with Standard Practice Instruction 1534 (Management of Materials, Wastes, and Petroleum Products). Waste treatment or disposal is not allowed at the installation under the UES.

Hazardous waste, whether generated by installation activities or range users, is collected at individual work sites in waste containers. These containers are labeled in accordance with the waste which they contain and are dated the day that the first waste is collected in the container.

Containers are kept at the point of generation until full or until a specified time limit is reached. Once full, containers are collected from the generation point within 72 hours and are prepared for transport to the Hazardous Waste Storage Facility (Building 1521) on Kwajalein. Each of the accumulation site is designed to handle hazardous waste and provide the ability to contain any accidental spills of material, including spills of full containers, until appropriate cleanup can be completed.

Hazardous wastes are accumulated for up to 90 days; any sampling and waste characterization is performed during that time prior to off-island shipment for disposal. All hazardous and regulated wastes are shipped off-island for disposal in the continental United States. The barge departs Kwajalein approximately every 2 weeks.

In accordance with the UES, USAGKA has prepared a Kwajalein Environmental Emergency Plan (KEEP) for responding to releases of oil, hazardous materials, pollutants, and contaminants to the environment. The KEEP is a contingency plan similar to a spill prevention, control, and countermeasure plan, but it incorporates response provisions of a National Contingency Plan. The hazardous materials management plan is incorporated into the KEEP.

3.2.6 Health and Safety - US Army Garrison Kwajalein Atoll

Region of Influence

For the proposed action, the RTS would provide range support for the terminal phase of the AHW FT2 HTT demonstration. There would be no requirements or issues related to launch safety, launch hazards, or rocket propellant handling at the installation, RTS and elsewhere within the RMI. Thus, the region of influence for health and safety at USAGKA includes all areas where the reentry

vehicles impact on Illeginni Islet and in the ocean waters near USAGKA—the same general area now used for intercontinental ballistic missile Force Development Evaluation flights. This includes the hazard area outside the atoll, where post-boost vehicle fragments sometimes impact.

Affected Environment

The Reagan Test Site is the only designated target area for the proposed missile launch operations from the Kodiak Launch Complex. All program operations must first receive approval from the Safety Office at RTS. This is accomplished through presentation of the proposed program to the Safety Office. All safety analyses, SOPs, and other safety documentation applicable to operations affecting the RTS must be provided, along with an overview of mission objectives, support requirements, and schedule. The Safety Office evaluates this information and ensures that all range safety requirements (including both ground and flight safety) and supporting regulations are followed. Final responsibility and authority for the safe conduct of missile and flight test operations lies with the RTS Commander.

Range safety provides protection to installation personnel, inhabitants of the Marshall Islands, and ships and aircraft operating in areas potentially affected by missions. Specific procedures are required for the preparation and execution of missions involving aircraft, missile launches, and reentry vehicles. These procedures are based on regulations, directives, and flight safety plans for individual missions. The flight safety plans include evaluating risks to inhabitants and property near the flight path, calculating trajectory and debris areas, and specifying range clearance and notification procedures. Criteria used at RTS to determine debris hazard risks are in accordance with RCC Standard 321-07, *Common Risk Criteria Standards for National Test Ranges* (Range Commanders Council, 2007).

Inhabitants near the flight path, as well as air and sea traffic in caution areas designated for specific missions, are notified of potentially hazardous operations. As described earlier for KLC, a NOTMAR and a NOTAM are transmitted to appropriate authorities to clear traffic from these caution areas and to inform the public of impending missions. The warning messages describe the time, the area affected, and safe alternate routes. The RMI Government is also informed in advance of rocket launches and reentry payload missions.

Radar and/or visual sweeps of hazard areas are accomplished immediately prior to operations to assist in the clearance of non-mission ships and aircraft. For terminal flight tests conducted within the Mid-Atoll Corridor Impact Area at RTS (see Figure 2-4) - such as for the AHW FT2 HTT demonstration - a number of additional precautions are taken to protect personnel and the general public. Such precautions may consist of evacuating nonessential personnel and sheltering all other personnel remaining within the Mid-Atoll Corridor.

Since RTS will be used during flight tests only as the target area, no health and safety issues related to launch safety, launch hazards, or fuels handling apply. The relevant issue is post-boost vehicle and re-entry vehicle impact area safety.

Prior to flight operations, proposed trajectories are analyzed and a permissible flight corridor is established. A flight that strays outside its corridor is considered to be malfunctioning and to constitute an imminent safety hazard. A destruct package, installed in all flight vehicles capable of impacting inhabited areas, is then activated. Activating the destruct package effectively halts the continued powered flight of the hardware, which falls to the ocean along a ballistic trajectory.

3.2.7 Noise - US Army Garrison Kwajalein Atoll

Region of Influence

During terminal flight and impact at RTS, the AHW FT2 HTT demonstration has the potential to affect land areas with sonic booms. Thus, the region of influence for noise is focused primarily on those RMI atolls and islands closest to proposed flight path. For the land impact scenario, Kwajalein, Likiep, Ailuk, Taka, and Utirik Atolls, as well as Jemo Island, might be affected. For the BOA scenarios, Bikar, Taka, and Utirik Atolls might be affected. Census records from 1999 indicate 527 residents on Likiep Atoll, 513 on Ailuk Atoll, 433 on Utirik Atoll; and none on Bikar and Taka Atolls or on Jemo Island. Kwajalein Atoll has the highest population within the region of influence with a total population of approximately 12,500, including U.S. personnel and Marshallese residents.

Affected Environment

Natural sources of noise on these remote atolls include the constant wave action along shorelines and the occasional thunderstorm. The sound of thunder, one of the loudest sounds expected here, can register up to 120 dB. Within the atoll communities, other sources of noise include a limited number of motor vehicles, motorized equipment, and the occasional fixed-wing aircraft at the Utirik airfield. Typical daytime noise levels within the local communities are expected to range between 55 and 65 dBA. Ambient noise levels at the installation are slightly greater because of higher levels of equipment, vehicle, and aircraft operations. On Kwajalein Island, for example, there are several aircraft flights per week, including military and commercial jet aircraft.

UES policies for noise management specify conformance with the U.S. Army's Environmental Noise Management Program and noise monitoring provisions as specified in Army Regulation 200-1 (*Environmental Protection and Enhancement*). As an Army installation, USAGKA also implements the Army's Hearing Conservation Program as described in Department of the Army Pamphlet 40-501 (*Hearing Conservation Program*). Army standards require hearing protection

whenever a person is exposed to steady-state noise greater than 85 dBA, or impulse noise greater than 140 dB, regardless of duration. Army regulations also require personal hearing protection when using noise-hazardous machinery or entering hazardous noise areas.

3.2.8 Water Resources - US Army Garrison Kwajalein Atoll

There are no sources of potable groundwater on Illeginni; the islet is uninhabited except for mission and special support activity events. Likewise, there are no identified surface water bodies identified (Figure 3-3). Some small areas of surface water are identified, but the infrequency and intermittent nature prevents them from being considered viable habitat. In the unlikely event of an accidental release of hazardous material at the storage area, emergency response personnel would comply with the KEEP.

3.3 BROAD OCEAN AREA

Rationale for Environmental Resources Analyzed

The proposed AHW FT2 HTT activities in broad ocean areas could impact air quality, biological resources, and water resources; as such, only these environmental resource topics are discussed. Some resource topics were not analyzed further for the broad ocean areas because: (1) the Proposed Action requires minimal ground-disturbing activities at Illeginni Islet, thus no impacts to soils would be expected; (2) mostly existing base personnel would be involved, thus, there are no socioeconomic concerns; (3) through avoidance of high altitude jet routes and the application of existing RTS range safety procedures, there would be no major impacts on airspace or health and safety; and (4) the Proposed Action is well within the limits of current operations at the installation. Thus, there would be no adverse effects on hazardous materials and waste management, land use, transportation, or utilities.

3.3.1 Air Quality - Broad Ocean Area

Region of Influence

During its flight path, the emissions from the targets and interceptors have the potential to affect air quality in the global upper atmosphere.

Stratospheric Ozone Layer

The stratosphere, which extends from 6 miles to approximately 30 miles in altitude, contains the earth's ozone layer (National Oceanic and Atmospheric Administration, 2008). The ozone layer plays a vital role in absorbing harmful ultraviolet radiation from the sun. Over the last 20 years, anthropogenic (human-made) gases released into the atmosphere—primarily chlorine related

substances—have threatened ozone concentrations in the stratosphere. Such materials include chlorofluorocarbons (CFCs), which have been widely used in electronics, and refrigeration systems, and the lesser-used Halons, which are extremely effective fire extinguishing agents.

Once released, the motions of the atmosphere mix the gases worldwide until they reach the stratosphere, where ultraviolet radiation releases their chlorine and bromine components. Through global compliance with the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer and amendments, the worldwide production of CFCs and other ozone-depleting substances has been drastically reduced and banned in many countries. A continuation of these compliance efforts is expected to allow for a slow recovery of the ozone layer.

Greenhouse Gases and Global Warming

Greenhouse gases (GHG) are components of the atmosphere that contribute to the greenhouse effect and global warming. Several forms of GHG occur naturally in the atmosphere, while others result from human activities, such as the burning of fossil fuels. Federal agencies, states, and local communities address global warming by preparing GHG inventories and adopting policies that will result in a decrease of GHG emissions.

According to the Kyoto Protocol and Hawaii's Global Warning Solution Act 234 (United Nations Framework Convention on Climate Change, 2008), there are six GHG: Carbon dioxide (CO_2), Nitrous oxide (N_2O), Methane (CH_4), Hydrofluorocarbons, Perfluorocarbons, and Sulfur hexafluoride.

Although the direct GHGs (CO_2, CH_4, and N_2O) occur naturally in the atmosphere, human activities have changed GHG atmospheric concentrations. Since the pre-industrial era (i.e., ending about 1750) to 2004, concentrations of CO_2 have increased globally by 35 percent.

Within the United States, fuel combustion accounted for 94 percent of all CO_2 emissions released in 2005. On a global scale, fossil fuel combustion added approximately 30×10^9 tons of CO_2 to the atmosphere in 2004, of which the United States accounted for about 22 percent

Since 1900, the earth's average surface air temperature has increased by about 1.2–1.4°F. The warmest global average temperatures on record have all occurred within the past 15 years, with the warmest 2 years being 1998 and 2005. With this in mind, the DoD is supporting climate changing initiatives globally, while preserving military operations, sustainability, and readiness by working, where possible, to reduce GHG emissions.

3.3.2 Biological Resources - Broad Ocean Area

For biological resources in deep ocean waters, the region of influence focuses on the broad ocean Alternative flight test impact site located north of USAGKA. The region of influence also includes other international ocean areas and territorial waters of the RMI that might be affected by the payload sonic booms.

Ocean depths in this region of the RMI generally range between 6,560 and 16,400 feet. There is a wide variety of pelagic and benthic communities in the broad ocean. A number of threatened, endangered, and other protected species occur here, including whales, small cetaceans, and sea turtles. Some of these species occur only seasonally for breeding or because of unique migration patterns.

As previously described, there are many different sources of noise in the marine environment, both natural and anthropogenic. Within the region of influence, some of the loudest underwater sounds generated are most likely to originate from storms, ships, and some marine mammals.

Region of Influence

The region of influence for broad ocean species includes the areas of the Pacific Ocean beyond 12 nautical miles from the shore where planned booster drops and the payload may impact.

Wildlife

The average ocean depth within much of the region of influence is over 10,000 feet. Marine biological communities in the deep ocean waters can be divided into two broad categories: pelagic (live in the water column) and benthic (associated with the bottom).

The organisms living in pelagic communities may be drifters (plankton) or swimmers (nekton). The plankton consists of plant-like organisms (phytoplankton) and animals (zooplankton) that drift with the ocean currents, with little ability to move through the water on their own. The nekton consists of animals that can swim freely in the ocean, such as fish, squids, sea turtles, and marine mammals.

Benthic communities are made up of marine organisms that live on or near the sea floor, such as bottom dwelling fish, shrimps, worms, snails, and starfish.

In the marine environment, there are many different sources of noise, both natural and anthropogenic (manmade). Biologically produced sounds include whale songs, dolphin clicks, and fish vocalizations. Natural geophysical sources include wind-generated waves, earthquakes, precipitation, and lightning storms. Anthropogenic sounds are generated by a variety of activities,

including commercial shipping, geophysical surveys, oil drilling and production, dredging and construction, sonar systems, DoD test activities and training maneuvers, and oceanographic research.

While measurements for sound pressure levels in air are referenced to 20 micropascals [μPa], underwater sound levels are normalized to 1 μPa at 3.3 feet away from the source, a standard used in underwater sound measurement. Within the region of influence, some of the loudest underwater sounds generated are most likely to originate from storms, ships, and some marine mammals. The sound of thunder from lightning strikes can have source levels of up to 260 dB. A passing supertanker can generate up to 190 dB of low frequency sound. For marine mammals, dolphins are known to produce brief echolocation signals over 225 dB, while mature sperm whale clicks have been calculated as high as 232 dB.

The North Pacific Ocean contains a number of threatened, endangered, and other protected species, including whales and small cetaceans, pinnipeds, and sea turtles. These are listed in Table 3-3 for ocean areas within the region of influence. Many of these species can be found off the West Coast of the United States or near the Hawaiian Islands, but they are sometimes seasonal in occurrence because of unique migration patterns. Some species, particularly the larger cetaceans, can occur hundreds or thousands of miles from land.

Threatened and Endangered Wildlife Species

On the ocean side of the atoll, marine mammals have been seen and/or heard (underwater clicking sounds) in the vicinity of Illeginni Islet as described in Section 3.2.3. Table 3-3 lists threatened and endangered species in the Open Ocean region of influence.

Table 3-3 Protected Marine Mammal and Sea Turtle Species Occurring within the North Pacific Over-Ocean Flight Corridor

Common Name	Scientific Name	Federal Status
Pinnipeds		
Guadalupe fur seal	Arctocephalus townsendi	T
Northern fur seal	*Callorhinus ursinus*	MMPA
Steller sea lion	*Eumetopias jubatus*	E
Northern elephant seal	*Mirounga angustirostris*	MMPA
Hawaiian monk seal	*Monachus schauinslandi*	E
Pacific harbor seal	*Phoca vitulina richardsi*	MMPA
California sea lion	*Zalophus californianus*	MMPA
Small Cetaceans		
Common dolphin	*Delphinus delphis*	MMPA
Pygmy killer whale	*Feresa attenuata*	MMPA
Short-finned pilot whale	*Globicephala macrorhynchus*	MMPA

Common Name	Scientific Name	Federal Status
Risso's dolphin	*Grampus griseus*	MMPA
Pygmy sperm whale	*Kogia breviceps*	MMPA
Dwarf sperm whale	*Kogia sima*	MMPA
Fraser's dolphin	*Lagenodelphis hosei*	MMPA
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	MMPA
Northern right whale dolphin	*Lissodelphis borealis*	MMPA
Killer whale	*Orcinus orca*	MMPA
Melon-headed whale	*Peponocephala electra*	MMPA
Harbor porpoise	*Phocoena phocoena*	MMPA
Dall's porpoise	*Phocoenoides dalli*	MMPA
False killer whale	*Pseudorca crassidens*	MMPA
Pantropical spotted dolphin	*Stenella attenuata*	MMPA
Striped dolphin	*Stenella coeruleoalba*	MMPA
Spinner dolphin	*Stenella longirostris*	MMPA
Rough-toothed dolphin	*Steno bredanensis*	MMPA
Bottlenose dolphin	*Tursiops truncatus*	MMPA
Beaked Whales		
Longman's beaked whale	*Indopacetus pacificus*	MMPA
Blainsville's beaked whale	*Mesoplodon densirostris*	MMPA
Cuvier's beaked whale	*Ziphius cavirostris*	MMPA
Large Odontocetes and Baleen Whales		
Minke whale	*Balaenoptera acutorostrata*	MMPA
Sei whale	*Balaenoptera borealis*	E
Bryde's whale	*Balaenoptera edeni*	MMPA
Blue whale	*Balaenoptera musculus*	E
Fin whale	*Balaenoptera physalus*	E
Gray whale	*Eschrichtius robustus*	MMPA
North Pacific right whale	*Eubalaena japonica*	E
Humpback whale	*Megaptera novaeangliae*	E
Sperm whale	*Physeter macrocephalus*	E
Sea Turtles		
Loggerhead sea turtle	*Caretta caretta*	T
Green sea turtle	*Chelonia mydas*	T
Leatherback sea turtle	*Dermochelys coriacea*	E
Hawksbill sea turtle	*Eretmochelys imbricata*	E
Olive ridley sea turtle	*Lepidochelys oliveacea*	T

Source: National Oceanic and Atmospheric Administration, 2009; US Department of the Air Force, 2006
MMPA = Protected under the Marine Mammal Protection Act
E = Endangered
T = Threatened

3.3.3 Water Resources - Broad Ocean Area

Region of Influence

The open ocean area region of influence includes those areas below the potential AHW FT2 HTT demonstration flight corridors and the first stage, fairing, and second stage drop areas in the central North Pacific Ocean. The average depth of the ocean area region of influence is 12,900 feet.

Affected Environment

The general composition of the ocean includes water, sodium chloride, dissolved gases, minerals, and nutrients. These characteristics determine and direct the interactions between the seawater and its inhabitants. The most important physical and chemical properties are salinity, density, temperature, pH, and dissolved gases. For oceanic waters, the salinity is approximately 35 parts of salt per 1,000 parts of seawater. Most organisms have a distinct range of temperatures in which they may thrive. A greater number of species live within the moderate temperature zones, with fewer species tolerant of extremes in temperature.

Surface seawater often has a pH between 8.1 and 8.3 (slightly basic), but generally is very stable with a neutral pH. The amount of oxygen present in seawater will vary with the rate of production by plants, consumption by animals and plants, bacterial decomposition, and surface interactions with the atmosphere. Most organisms require oxygen for their life processes.

Carbon dioxide is a gas required by plants for photosynthetic production of new organic matter. Carbon dioxide is 60 times more concentrated in seawater than it is in the atmosphere.

Ocean Zones

Classification of the Pacific Ocean zones is based on depth and proximity to land. Using this methodology, there are four major divisions or zones in the ocean: the littoral zone, the coastal zone, the offshore zone, and the pelagic zone. Spanning across all zones is the benthic environment, or sea floor. This section discusses the pelagic zone and the benthic environment.

The pelagic zone is commonly referred to as the open ocean. The organisms that inhabit the open ocean typically do not come near land, continental shelves, or the seabed. Approximately 2 percent of marine species live in the open ocean.

The bottom of the sea floor is known as the benthic area. It comprises 98 percent of the species of animals and plants in the ocean. Less than 1 percent of benthic species live in the deep ocean below 6,562 feet.

Biological Diversity

Marine life ranges from microscopic one-celled organisms to the world's largest animal, the blue whale. Marine plants and plant-like organisms can live only in the sunlit surface waters of the ocean, the photic zone, which extends to only about 330 feet below the surface. Beyond the photic zone, the light is insufficient to support plants and plant-like organisms. Animals, however, live throughout the ocean from the surface to the greatest depths. The organisms living in pelagic communities may be drifters (plankton) or swimmers (nekton).

The plankton consists of plant-like organisms and animals that drift with the ocean currents, with little ability to move through the water on their own. The nekton consists of animals that can swim freely in the ocean, such as fish, squids, and marine mammals. Benthic communities in the vicinity of Illeginni are made up of marine organisms, such as kelp, sea grass, giant clams, top-shell snails, black-lipped pearl oysters, sponges, coral, sea cucumbers, sea stars, and crabs that live on or near the sea floor.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental consequences of the No-Action and Proposed Action Alternatives by comparing these activities with the potentially affected environmental components described in Section 3.0. The amount of detail presented in each section is proportional to the potential for impacts.

To assess the potential for and significance of environmental impacts, a list of actions and alternative was developed (Section 2.0) and the environmental setting was described, with emphasis on any special environmental sensitivities (Section 3.0). Program activities were then assessed with the potentially affected environmental components to determine the environmental impacts of these activities.

4.1 KODIAK LAUNCH COMPLEX

4.1.1 Air Quality - Kodiak Launch Complex

4.1.1.1 Site Preparations

Existing facilities and equipment would be used at KLC; no construction is planned. Thus, minimal impacts to air quality (machinery required to receive and prepare the technology for launch) at KLC would be anticipated from site preparation activities at the launch site.

4.1.1.2 Launch Activities

Previous STARS booster launches at the Kodiak Launch Complex provide a relevant baseline of comparison for the proposed AHW FT2 HTT launch event. Although there are slight differences compared to the proposed AHW FT2 HTT launch, the initial lift phase will have the same or similar air quality impact at KLC as described in the Advanced Hypersonic Weapon Program EA. **Error! Reference source not found.** provides an estimate of the representative emissions generated by a STARS booster launch.

Table 4-1 Estimated Emissions from a Typical STARS booster Launch (tons per launch)

Missile	Aluminum Oxide (Al_2O_3)(1)	Carbon Monoxide (CO)	Carbon Dioxide (CO_2) (2)	Hydrogen	Water	Hydrogen Chloride(1)	Nitrogen Oxides (NO_x)(2)	Lead	Others
Strategic Target System(1)	5.628	4.185	0.431	0.318	0.959	1.943	1.855	0.000	0.027

Source: U.S. Department of the Navy, 1998
Notes: Exhaust products are total for all three stages
(1) Ozone-depleting Substances
(2) Greenhouse Gas

Each launch is a discrete event, and the launch of the proposed technology from KLC would be reasonably similar to launches of other test missiles and rockets from KLC (with various booster configurations and propellants used). These launches are characterized by intense combustive reactions over a short period, which result in exhaust streams of varying sizes, depending upon size of launch vehicle.

Direct and Indirect Effects

The potential for air quality effects related to current launching activities at the KLC (and other similar facilities) has been evaluated in previous NEPA documents (Section 1.3). Permanent air quality effects due to rocket launches were not expected at the time of the 1996 EA and have not been documented as a result of the previous 16 rocket launches that have occurred at the KLC. Since 1996, a one-hour NAAQS for nitrogen dioxide and annual and 24-hour standards for PM2.5 have been established. Both NO_X and PM2.5 disperse readily; NO_X is a gas and the tiny particles of PM2.5 diffuse widely under the generally windy conditions present at KLC. Ground level concentrations of these two pollutants are not expected to approach or exceed the NAAQS beyond the KLC due to the short period of time the rockets are close enough to the ground to emit these pollutants.

The emissions of concern from launching solid-propellant rockets are hydrogen chloride, carbon monoxide, nitrogen oxides, black carbon and aluminum oxide. Hydrogen chloride emissions are gaseous; aluminum oxide is emitted as a particulate. Hydrogen chloride can combine with water vapor in the atmosphere or liquid from a deluge system to create hydrochloric acid. No water deluge system has previously been used at the KLC and is not currently proposed for solid-propellant rockets.

The omission of a water deluge system for solid rocket motors greatly reduces the amount of hydrogen chloride that would contact the ground during a launch and minimizes associated environmental effects. Based on research performed for the U.S Air Force for the very large Titan IV rocket, concentrations of hydrogen chloride would be less than 10 ppm for a rocket flyby of 2 minutes. The STARS rocket vehicle proposed for the AHW FT2 HTT would have far fewer emissions and produce far lower concentrations of hydrogen chloride.

Hydrogen chloride vapor concentrations would be less than OSHA permissible exposure limit of 5 ppm. The potential concentrations that the general public could experience would be much lower due to the large distances between the KLC and areas accessible to the general public; no individual may be within two miles of a launching rocket, and the general public are not allowed on the KLC until the launch has occurred and the launch pad area has been cleared for hazards by qualified personnel. The hydrogen chloride emissions do create holes in the ozone layer, but these holes are filled in from the adjacent atmosphere. For the very large Titan IV rockets this repair may take “a

few weeks". For the much smaller rockets proposed for the KLC launch, the damage and repair time would be less.

Historic launches from the KLC have included solid-propellant rockets only. The chemical quantities and composition of the exhaust products from the STARS rocket will generally be the same when compared to small-lift rockets previously launched from the KLC. Air quality effects from previous launches have been documented as temporary and localized.

On-site personnel may safely return to the launch pad without air quality concerns as soon as the pad has been visually cleared by the pad safety officer, usually after 10 minutes. Security checkpoints on mission day prevent the general public from approaching the launch pad closer than two miles. Short-term effects within the area immediately surrounding the launch pad include high temperature exhaust gas mixture and elevated carbon monoxide concentrations. Previous observations indicate that ambient air temperature at the launch pad returns to pre-launch conditions within 10 minutes, and so would the pollutant concentrations. The exhaust clouds dissipate after each launch and are generally carried seaward by prevailing winds from the northwest.

The nearest residential populations are about 2.5 miles from the launch pad and are unlikely to experience pollutant concentrations approaching or exceeding the NAAQS. Even people near the facility boundary or marine traffic directly offshore would be extremely unlikely to experience pollutant concentrations exceeding the NAAQS. Launch-specific environmental monitoring studies have shown that chemical exhaust products are not accumulating in surface waters or affecting the localized environment.

Given that previous launches have had no measurable adverse effect on air quality, and considering the foregoing analysis, the launching of STARS rockets is not expected to produce pollutant concentrations approaching or exceeding the short-term NAAQS. Supporting this conclusion is the Supplemental Environmental Assessment for the California Spaceport at Vandenberg AFB, where a proposed launching of 24 (larger) Athena III rockets annually was found to produce only 2.48 tons/year of ozone precursors (NO_X). This quantity is well below a threshold level of 100 tons that triggers a requirement for a conformity analysis in non-attainment and maintenance areas (the KLC is located in neither). For comparison, up to nine launches per year at the KLC of the (smaller) STARS rockets would produce less than 1 ton/year (i.e. $9/24^{th}$ of 2.48 tons, or 0.93 tons).

The STARS booster vehicle is generally within the bulk atmospheric mixing zone within a minute or so of launch. Dispersion rates of the pollutants varies and depends upon the local meteorological conditions, wind speed and mixing height. As a location, Kodiak Island is well suited for the dispersion of exhausts due to the prevailing wind pattern, as previously described in **Error!**

Reference source not found.. Launch-related emissions would not have long-term negative atmospheric effects, given to typical wind conditions and low occurrence of "calms" at the site.

Portable and fixed back-up diesel generators are routinely used to support launch facilities including the Mobile Range and Safety System (see Figure 2-2), the launch control center, and launch pad structures (including integration processing facility and spacecraft and assemblies building and rocket staging facility). Equipment use data for these generators indicate they are used on an infrequent, intermittent, and short-term basis. The levels of emissions emitted from these sources under the Proposed Action would negligibly increase the baseline, and would remain far below permit thresholds; therefore this source category is not anticipated to have a direct or indirect effect on air quality.

Cumulative Effects

As shown in the findings of long term water quality monitoring, emissions from rocket launches dissipate after each launch and short-term effects are minor and temporary in nature. Individual launches do not result in anything other than transitory, highly localized effects to air quality; therefore the cumulative effects resulting from past and reasonably foreseeable launch activities, or other reasonably foreseeable projects, are not considered to be significant.

Carbon dioxide and black carbon ("soot") are emitted rocket exhaust products that have the potential to contribute to climate change. These emissions are also considered negligible and insignificant especially when compared to amounts of these pollutants emitted by elements of Alaska's transportation system, industry, and natural sources such as forest fires and volcanoes.

4.1.2 Airspace - Kodiak Launch Complex

4.1.2.1 Site Preparation Activities

Proposed site preparation activities (Mechanical Pathfinder activities, airlift delivery of STARS booster stages, the payload, and related hardware), involve flights in and out of the Kodiak Airport. However, the Proposed Action would not restrict access to, nor affect the use of, existing airfields and airports in the region of influence. Access to the Kodiak Airport would not be affected. All arriving and departing aircraft and all participating military aircraft are under the control of the Kodiak Airport Operations and Anchorage Center; thus, there would be no airport conflicts in the region of influence under the Proposed Action, and no impact.

Prior to the launch event and closure of the hazard area, launch safety officials will coordinate to ensure that the area is clear of aircraft. NOTAMs are issued by the FAA which identify areas to remain clear of and the times that avoidance of the area is advised.

4.1.2.2 Launch Activities

The AHW FT2 HTT launch would be scheduled at a time that would avoid periods of high numbers of air traffic based on FAA approval. KLC range safety and mission management personnel would conduct an analysis of the risks associated with the mission activities prior to conducting the launch to ensure risk and debris dispersion criteria are met. Range Control would communicate with the operations conductors and all participants entering and leaving the range areas as well as with other agencies such as the FAA Anchorage ARTCC in Anchorage, and the Kodiak airfield control tower. The acceptable level of risk to aircraft and the persons on board would continue to follow the RCC Standard 321-02; only the location of the requested airspace would change.

For the launch, KLC coordinates with the Anchorage ARTCC or Oakland ARTCC military operations specialist assigned to handle such matters using Altitude Reservation (ALTRV) request procedures. After receiving the proper information on each test flight, a hazard pattern would be constructed and sent to the military operations specialist at the Oakland ARTCC requesting airspace. When approval of the request of the airspace is received, KLC would submit an ALTRV request to Central Altitude Reservation Function, which publishes the ALTRV 72 hours prior to the flight test. With these procedures in place, the proposed activities do not conflict with any airspace use plans, policies, and controls.

Controlled and Uncontrolled Airspace

No new airspace proposal or any modification to the existing controlled airspace has been identified to accommodate proposed testing. Activation of the proposed stationary ALTRV procedures, where the FAA provides separation between non-participating aircraft and the missile flight test activities for use of the required airspace, would impact the controlled airspace available for use by non-participating aircraft for the duration of the ALTRV—usually for a matter of a few hours, with a backup day reserved for the same hours. The relatively sparse use of the area by commercial aircraft and the advance coordination with the FAA regarding ALTRV requirements should result in minimal impacts on controlled and uncontrolled airspace from missile testing activities.

En Route Airway Jet Routes

Two Instrument Flight Rules en route low altitude airways, V15 (through W-188) and V16 (through W-186), are used by commercial aircraft that pass through the Kodiak Launch Complex Warning Areas.

Use of these low altitude airways comes under the control of the Anchorage Control Facility. In addition, provision is made for surveillance of the affected airspace either by radar or patrol aircraft. Safety regulations dictate that hazardous activities will be suspended when it is known that any non-participating aircraft has entered any part of the training danger zone until the nonparticipating entrant has left the area or a thorough check of the suspected area has been performed. The AHW FT2 HTT launch would be conducted in compliance with DoD Directive 4540.1, as enclosed by OPNAVINST 3770.4A. DoD Directive 4540.1 specifies procedures for conducting missile and projectile firing, namely "firing areas shall be selected so that trajectories are clear of established oceanic air routes or areas of known surface or air activity". Therefore, potential impacts on civilian aircraft are avoided.

Before conducting the launch, NOTAMs would be sent in accordance with the conditions of the directive specified in OPNAVINST 3721.20. In addition, to satisfy airspace safety requirements, the responsible commander would obtain approval from the Administrator, FAA, through the appropriate Navy airspace representative. Provision is made for surveillance of the affected airspace either by radar or patrol aircraft. In addition, safety regulations dictate that hazardous activities would be suspended when it is known that any non-participating aircraft has entered any part of the danger zone until the non-participating entrant has left the area or a thorough check of the suspected area has been performed.

In addition to the procedures cited above, there is a scheduling agency identified for each piece of special use airspace that would be used. The procedures for scheduling each piece of airspace are performed in accordance with letters of agreement with the controlling FAA facility, and the Anchorage and Honolulu Control Facilities, as well as the Oakland ARTCC. Schedules are provided to the FAA facility as agreed among the agencies involved. Real-time airspace management involves the release of airspace to the FAA when the airspace is not in use or when extraordinary events occur that require drastic action, such as weather requiring additional airspace.

Airports and Airfields

The AHW FT2 HTT launch would not restrict access to, or affect arriving and departing flights at existing area airfields and airports in the region of influence. Commercial and private aircraft would be notified in advance of launch activities through NOTAMs by the FAA. If Medevac or other emergency flights are requested prior to the launch, the mission would hold until the medical emergency requiring the flight is over.

4.1.2.3 Post-launch Activities

Flights required as part of the post flight activities (once the fragments from an impact have settled) would not restrict access to, nor affect the use of, existing airfields in the ROI. Operations at the airfield would not be obstructed. Existing airfield or airport arrival and departure traffic flows would also not be affected, and access to the airfield would not be curtailed. All arriving and departing aircraft and all participating military aircraft are under the control of the Anchorage ARTCC or Kodiak Airport Control Tower; thus, there would be no airfield conflicts in the region of influence, and no impact.

4.1.3 Biological Resources - Kodiak Launch Complex

4.1.3.1 Site Preparation Activities

Vegetation

Compliance with relevant site management policies and procedures limits the potential for introduction of invasive weed plant species. Equipment (specifically test components) flown directly to Kodiak from the Continental US is primarily packaged or containerized by the manufacturer in virtually sterile conditions with regard to the potential for invasive plants or animals.

Threatened and Endangered Plant Species

No threatened or endangered vegetation is located within the launch site boundary or in the offshore area, and thus no adverse effects are anticipated.

Wildlife

Site preparation activities would not result in impacts to EFH since no water bodies on base would be affected. The combination of increased noise levels and human activity would likely displace some birds and small mammals (e.g., common field and cosmopolitan birds and small mammals) that forage, feed, or nest within and adjacent to the vehicle preparation site. Foraging water birds would be subjected to increased energy demands if flushed by the noise, but this should be a short-term, minimal impact. Proposed activities would not impact the wetlands that these native water birds use for resting, nesting, and foraging. Bird migration patterns would not be altered.

Threatened and Endangered Wildlife Species

Threatened and endangered marine mammals and bird species would not be affected since no site preparation activities would take place offshore.

Environmentally Sensitive Habitat

Pinniped haul-outs associated with nearby Ugak Island are an important and environmentally sensitive habitat proximate to the KLC. Site preparation activities would not affect this area of critical habitat.

4.1.3.2 Flight Activities

Vegetation

Any vegetation near the selected launch pad could undergo temporary distress from heat generated at launch, resulting in wilting of new growth. However, vegetation is normally cleared from areas adjacent to the launch site, and the duration of high temperatures is extremely short (a few seconds); consequently, no long-term adverse impacts on vegetation are anticipated.

Threatened and Endangered Plant Species

Endangered and threatened plant species do not occur in proximity to the KLC or Kodiak Island and will not be affected by flight activities.

Environmentally Sensitive Habitat

Marine Critical Habitat for Northern sea otter and Steller's sea lion surround the KLC. However, the short duration of flight activities is not expected to result in changes or negative alterations to this habitat.

Wildlife

The effects of noise on wildlife vary from serious to no effect in different species and situations. Behavioral responses to noise also vary from startling to retreat from favorable habitat. Animals can also be very sensitive to sounds in some situations and very insensitive to the same sounds in other situations. Noise from launches may startle nearby wildlife and cause flushing behavior in birds, but this startle reaction would be of short duration.

The increased presence of personnel, vehicles, and equipment (generators, motors) immediately before a launch would tend to cause birds and other mobile species of wildlife to temporarily leave the area that would be subject to the highest level of launch noise. However, launch-related noise exceeds ambient levels for a relative short duration (approximately 90 seconds) within range areas. The cone extending down from the rocket directs exhaust blast at the ground surface during the initial seconds of the launch; the observed sound intensity peaks approximately 30 seconds after launch, then decreases as an inverse proportion to the square of the separation distance as the vehicle gains altitude.

Although noise monitoring locations immediately south of the launch pad range to 112.6dBA (SEL), the recorded sound pressure levels for previous STARS launches at Ugak Island (where seals are observed) have ranged from 90.2 to 91.4 dBA. Ambient noise levels on Ugak Island from waves and surf range to 85 dB (400 Hz).

Separate studies indicate no appreciable impact to whales in the launch area because of the small relative impact area beneath the exhaust cone and since airborne noise is generally reflected at the sea surface outside of a 26° cone extending downward from the ascending rocket. Pinnipeds have been previously monitored on Ugak Island during STARS booster launches; the numbers of harbor seals at the haulouts during the surveys indicate that the launch did not have an obvious effect on haulout occupation, and that daily peak (Ugak Island) attendance at the haulouts was not affected negatively during the launch event.

The probability for a launch mishap is very low. However, an early flight termination or mishap would cause rocket debris to impact along the flight corridor, potentially in offshore waters.

Debris would be removed from shallow water if possible. In most cases, the errant missile would be moving at such a high velocity that resulting missile debris will strike the water further downrange. The rocket would be sufficiently downrange that debris would be unlikely to reach back to the launch site.

Within offshore waters, the potential ingestion of contaminants by fish and other marine species will be remote because of atmospheric dispersion of the emission cloud, the diluting effects of the ocean water, and the relatively small area of the EFH that will be affected. The potential impact on EFH from nominal launch activities would mainly be from spent boosters and rocket debris to waters off the coast. By the time the spent rocket motors impact in the ocean, generally all of the propellants in them will have been consumed. Any residual aluminum oxide, burnt hydrocarbons, or propellant materials are not expected to present toxicity concerns.

Threatened and Endangered Species

Potential adverse effects on listed water birds that could be in or transiting the launch area at the time of launch would be limited to startle or flying away reactions in reaction to the launch noise. Because launch-related noise would be localized, intermittent, and occur over a relatively short term, the potential for effects on threatened or endangered wildlife would be minimal. Launch activities would incorporate procedures to avoid threatened or endangered wildlife that are foraging, resting, or hauled out, such as Steller sea lions or listed water birds. Other effects to threatened or endangered wildlife would be the same as those addressed above for wildlife in general.

4.1.3.3 Post Flight Activities

Vegetation

No additional impacts to indigenous or native vegetation are expected due to the removal of mobile equipment and assets brought to KLC

Threatened and Endangered Plant Species

No threatened or endangered vegetation has been identified at KLC.

Environmentally Sensitive Habitat

No environmentally sensitive habitats will be encountered or relevant to post flight activities.

Wildlife

The potential for impacts to wildlife would be similar to those described for site preparation activities.

Threatened and Endangered Wildlife Species

No threatened or endangered wildlife species will be encountered during post flight activities.

4.1.4 Hazardous Materials and Waste - Kodiak Launch Complex

4.1.4.1 Site Preparation Activities

KLC has well established procedures and facility for handling, storing, managing, and transporting hazardous substances, as well as resources for responding to spills, fires, and other hazardous conditions that could result from the Proposed Action. Launch activities would use small quantities of hazardous materials that could result in the generation of some hazardous waste.

The expected hazardous materials to be used are common products and may include diesel fuel, anti-freeze, hydraulic fluid, and lubricating oils. Any hazardous or nonhazardous wastes produced during site preparation activities would be containerized and properly disposed of in accordance with existing KLC standard operating procedures. Impacts to the environment are not anticipated from the presence of potentially hazardous materials and the generation of wastes during site preparation activities.

The system components for the Proposed Action would be transported to KLC as usual for temporary storage, pre-flight assembly and checkout, and flight preparation. These components

would be essentially finished products that would require only assembly on site at KLC in preparation for Pathfinder, spare, and flight assembly stages.

The 1996 Kodiak Launch Complex EA analyzed the effects of hazardous materials and solid waste generation associated with a maximum of nine rocket launches per year utilizing solid fuel source. The proposed action would not create an increase in the amount of solid waste generated at the KLC. KLC generates an average of 2.6 tons of solid waste a month during non-launch activity, and approximately 50 tons a month during a launch campaign; and this is not expected to vary during proposed action.

All of the Hazardous Materials, Pollution Prevention, and Solid Waste plans associated with the KLC would be reviewed and updated prior to mission activities at the site. The type and quantity of petroleum products or hazardous materials will be accounted for and incorporated into emergency planning to mitigate environmental effects in the event of a release. The Proposed Action would not require an increase in the storage amounts of petroleum-based products and other fuel constituents normally in use at KLC.

The nature of the launch technology does require storage of potentially hazardous materials inherent with rocket motors and solid rocket propellant; and Class 1.1, 1.2, and 1.4 explosives. The primary hazard related to storage of rocket components is injury due to potential or explosion/fire. Applicable State and Federal regulations, KLC range standard operating procedures, and launch/technology specific safety plans will be followed for handling potential hazardous and explosive materials required for the proposed action. Due to safety mitigation measures implemented, and personnel restrictions to only those trained and qualified, the storage of hazardous materials required for the proposed launch would not contribute to cumulative effects.

4.1.4.2 Flight Activities

Hazardous Material Management

The solid propellants associated with the proposed launch would be similar to past system launches from KLC, which have been exclusively solid booster technology to date. These actions would follow the same hazardous material and waste handling practices and procedures developed for the facility and described in the affected environment section. The types of hazardous materials used and hazardous wastes 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.

Hazardous Waste Management

During launch of the technology using a solid booster system, there is the potential for a mishap to occur, resulting in potentially hazardous debris and propellant falling within the Ground Hazard Area (GHA) or Launch Hazard Area (LHA) over water. As addressed for previous KLC launches, any hazardous materials that resulted from a flight termination or mishap would be cleaned up, and any contaminated areas would be remediated in accordance with existing KLC emergency response plans and hazardous materials and hazardous waste plans. All hazardous waste generated in such a mishap would be disposed in accordance with appropriate State and Federal regulations and DoD polices. Overall, no adverse impacts would result from hazardous materials used or hazardous wastes generated under the Proposed Action.

4.1.4.3 Post Flight Activities

Specific restoration actions and debris recovery, if necessary, would be determined on a case-by-case basis and involve the owners and appropriate agencies, and not necessarily KLC. If debris is deposited in the LHA over water, the booster vehicle would be sufficiently downrange that debris would be unlikely to reach back to the launch site or even the coastal areas around Narrow Cape or Kodiak Island. At the conclusion of launch activities, mission critical personnel would remove all mobile equipment/assets brought to the range. Any hazardous materials remaining would be used or disposed of in accordance with the KLC waste management plan.

4.1.5 Health and Safety - Kodiak Launch Complex

An impact would be considered if it involved materials or operations that posed a potential for public or occupational health hazard. Health and safety impacts were evaluated on the following criteria: potential for impacts to personnel during site preparation; for transportation mishaps; leaks or spills of fuel and propellants; impacts to aircraft and boats/ships; and public and personnel safety from launch-related activities.

4.1.5.1 Site Preparation Activities

Launch preparation activities will primarily be performed by civilians and should not result in injury or illness to site workers. KLC provides the storage location for all materials that would be used during the launch. The primary hazard related to transport and storage of rocket components is injury due to packaging and movement of components, and the potential for explosion/fire. Applicable State and Federal regulations, KLC range standard operating procedures, and launch/technology specific safety plans are followed in transporting and handling potentially explosive ordnance and hazardous materials that are required as part of the proposed action. Rocket components, including the propellant and explosives, are transported in Department of Transportation and military designed and approved shipping containers.

The protection afforded by shipping containers is sufficient to protect solid rocket motors from shock required to cause an explosion. In the unlikely event of a transportation accident, the solid propellants will likely burn rather than explode. The solid propellants would release combustion products, specifically hydrogen chloride, which would irritate the eyes and skin of persons nearby. Such an accident would not likely occur given the in-place safety procedures and policies at KLC during transportation and handling of rocket components. Explosive Safety Quantity Distances (ESQDs) are established at transshipping points.

On arrival at KLC, support equipment is placed in secure storage until assembly and launch preparations. ESQDs are established around ordnance storage and missile (rocket) assembly buildings. Access to storage and support facility is limited to trained and authorized mission critical personnel.

A pre-launch accident would be characterized by either an explosion and/or detonation of the rocket propellants, or a situation in which the rocket propellants burn without detonation or explosion. An ESQD surrounding the launcher is calculated based on the equivalent explosive force of all propellant and pyrotechnic materials contained on the flight vehicle. All potentially hazardous debris resulting from an accident on the launcher will be contained entirely within the ESQD, which will already have been cleared of unauthorized personnel.

The ground hazard area includes the area that may be at risk from a vehicle failure very early in flight and includes KLC and the coast areas around Narrow Cape. This area is in the vicinity of the launch arc, typically extending 1,000 to 20,000 feet from the launch point, depending on the vehicle and mission.

The ground hazard area for the Strategic Target Launch is a modified 10,000 feet from the launch location. Clearance of this region ensures that the marine vessels and air craft are excluded from any area that will be at risk from an errant missile in the time immediately after launch and before the Missile Flight Safety Officer could react to the malfunction (i.e., several seconds). The coastal area at Cape Narrow is uninhabited and there is one public road access to the beach adjacent to the launch facility, which is barricaded for launch.

Teams are available at KLC for fire suppression, hazardous materials emergency response, and emergency medical response during launch activities. KLC takes every reasonable precaution during the planning and execution of launch operations and activities to prevent injury to human life and property.

KLC has a fire truck and a 250-gal pumper mounted on a 1-ton truck to fight any brush fires that may occur during a launch. The KLC water system includes a 150,000-gallon storage tank that can be used to supply fire-fighting operations. The KLC also has an ambulance to transport injured

patients. During missions, Emergency Medical Technicians are present at the KLC with the oversight of Northwest Medical. During launch day operations an EMT 3 is in attendance at the KLC.

4.1.5.2 Flight Activities

Many procedures are in place to mitigate the potential hazards of an accident during proposed launch activities. The Proposed Action would comply with all KLC safety plans and procedures in place prior to the launch. The GHA and over water LHA are defined prior to the launch based upon the launch azimuths, flight trajectory, and debris impact zones. The launch vehicle would be sufficiently downrange such that debris would be unlikely to reach back to the launch site.

Commercial and private aircraft and ocean vessels would be notified in advance of launch activities through NOTAMs issued by the FAA and NOTMARs, respectively. Thus, commercial and private craft would be able to reschedule or choose alternate routes before the flight experiments.

To project people from injury from either nominal launches or accidents, two primary mitigation measures are in place: Flight termination and clearance of specified regions. Clearance areas include the ground hazard area for land areas, Ship Exclusion Zones for ocean areas, and Restricted Airspace and ALTRVs for airspace.

The Flight Termination System provides a mechanism to protect the public with very high reliability, even in the unlikely case of missile malfunction. Flight termination is performed by the Missile Flight Safety Officer if a missile malfunctions and leaves a predefined region or violates other predefined mission rules. The acceptable flight region is bounded by Destruct Limits, which are defined to make impact of potentially hazardous debris on populated areas highly unlikely. The Missile Flight Safety Officer terminates flight if the Instantaneous Impact Point of a vehicle crosses the Destruct Limits. The range safety system includes highly-reliable in-flight tracking and command destruction systems. The Missile Flight Safety Officer monitors in real-time missile performance and evaluates flight termination criteria.

Pasagshak Point Road will be closed at the site boundary (the only road access to KLC) and monitored during launch day to ensure that no unauthorized personnel enter the ground hazard area. However, access to an observation area at Pasagshak Point (approximately 4 miles west of the launch pad) is historically used by the general public. If the safety zone is compromised, the launch will be delayed until the area is confirmed clear.

4.1.5.3 Post Flight Activities

At the conclusion of testing activities, KLC and mission personnel may remove all mobile equipment/assets brought to the launch facility. These activities are routine for launches; no adverse health and safety impacts are expected from these activities.

Debris for a launch may impact the ground or open ocean (either from state jettison or from a flight termination action). Debris can consist of metals, solid propellant, and batteries. If applicable, potentially hazardous debris will be recovered from the ground or ocean (if it floats or impacts shallow water) and disposed of in accordance with applicable State, Federal, and KLC hazardous water requirements and operating procedures.

4.1.6 Noise - Kodiak Launch Complex

The impacts of noise on human receptors were evaluated based on whether the noise event would exceed DoD or Occupational Safety and Health Administration guidelines. The Proposed Action could result in minor noise impacts from site preparation activities and the launch. The analysis in this section is concerned with human receptors; noise effects on wildlife are discussed under biological resources.

4.1.6.1 Site Preparation Activities

Noise produced during Pathfinder and other pre-flight activities would include noise from mechanical equipment, including transportation of the boosters to the launch site. The increase in noise levels would be temporary and well below thresholds for occupational and incidental receptors.

4.1.6.2 Flight Activities

Noise would include transport vehicles, maintenance equipment, generators, and the launching and test equipment. KLC supports a variety of rocket missions; therefore, occasional rocket launches produce high-intensity, short-duration sound events. Recorded sound pressure levels for previous STARS launches at Ugak Island have ranged from 90.2 to 91.4 dBA.

The nearest seasonal housing and area of noise-sensitivity is approximately 2.5 to the west of KLC, the nearest year-round residences are about 4.25 miles from the KLC in a west-northwesterly direction. Both areas are low-lying and do not have direct line of sight to the launch pad, reducing associated acoustic impacts.

4.1.6.3 Post Flight Activities

Noise generated during post flight test activities generally mimic the pre-flight activities and would have minimal impact to off-facility areas.

4.1.7 Water Resources - Kodiak Launch Complex

This section addresses the potential impacts to water resources due to proposed activities. The impacts to water resources were evaluated based on whether the proposed activities would cause the following: a violation of applicable State or Federal water quality standards, related storm water pollution prevention plans, or other applicable water quality related plans, policies, or permit conditions; major changes in existing drainage and runoff patterns that alter the course of existing waterways or exceed the capacity of existing storm water drainage systems; or substantial degradation of water quality.

4.1.7.1 Site Preparation Activities

Site preparation activities would be confined within the immediate Kodiak Launch Complex area and would be in compliance with state and federal regulations and would not impact water resources.

4.1.7.2 Flight Activities

Under normal launch conditions, no water resource impacts are 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 rocket debris would be rapidly buffered and diluted by the alkaline sea and limited to within a few feet of the source. Although a potential impact to water resources could occur in the event of an accidental spill or premature flight termination that resulted in propellant coming in contact with water resources, in the unlikely event of an accidental release, emergency response personnel would comply with KLC Hazardous Materials Management and Hazardous Waste Management Plans.

4.1.7.3 Post Flight Activities

No adverse impacts to water resources on KLC are expected from post flight activities, such as the removal of all mobile equipment/assets brought to the range.

4.2 US ARMY GARRISON KWAJALEIN ATOLL

Environmental consequences address effects of the proposed actions within the previously introduced Affected Environments. The analysis includes associated impacts that pose potential environmental risk or health hazard, including the following criteria: potential for impacts to personnel during site preparation; for transportation mishaps; leaks or spills of fuel and propellants; impacts to aircraft and boats/ships; and public and personnel safety from launch-related activities. No evaluation and analysis is provided for unaffected environments.

4.2.1 Air Quality - US Army Garrison Kwajalein Atoll

No emissions and air quality impacts are noted for the pre-flight and flight activities, as these occur outside of the USAGKA region of influence. The terminal phase and impact of the AHW FT2 HTT article creates a relatively small amount of fugitive dust and debris on impact. The composition of the plume is primarily native soils and materials. Although the impact may provide mechanical re-suspension of trace residues from previous test events on Illeginni (i.e., beryllium and depleted uranium) impacts to air quality are temporary and considered insignificant. The environmental consequences of trace residue exposures on potential biological receptors are discussed in Section 4.2.3.2.

4.2.2 Airspace - US Army Garrison Kwajalein Atoll

Assessment of potential impacts to airspace is based on the following: if proposed activities have the potential to result in an obstruction to air navigation; modification to or new requirements for special use airspace; changes to existing air routes; or additional restricted access to regional airfields and airports.

4.2.2.1 Site Preparation Activities

Operations at the USAGKA airfields would not be obstructed by the presence of additional personnel for site preparation activities. Existing airfield arrival and departure traffic flows would also not be affected, and access to the airfield would not be curtailed. All arriving and departing aircraft and all participating military aircraft are under the control of the Bucholz Army Airfield Control Tower; thus, there would be no airfield conflicts in the region of influence, and no impact.

4.2.2.2 Flight Activities

Illeginni is located beneath international airspace and, therefore, has no formal airspace restrictions governing it. Commercial and private aircraft would be notified in advance of the AHW FT2 HTT demonstration launch as part of their routine operations through NOTAMs by the FAA.

To satisfy airspace safety requirements in accordance with Army Regulation 385-62, Regulations for Firing Guided Missiles and Heavy Rockets for Training, Target Practice, and Combat, the responsible commander would coordinate with the Administrator, FAA, through the appropriate U.S. Army airspace representative as required by Army Regulation 95-2, Air Traffic Control, Airspace, Airfields, Flight Activities, and Navigational Aids.

Provision would be made for surveillance of the affected airspace in accordance with Army Regulation 385-62. In addition, safety regulations dictate that operations would be suspended when it is known or suspected that any unauthorized aircraft have entered any part of the airspace above the hazard zone until the unauthorized entrant has been removed or a thorough check of the suspected area has been performed. No new special use airspace would be required.

NOTAMs would be issued to advise avoidance of the tracking radar areas during activation of the range, particularly in the vicinity of Kwajalein or Roi-Namur when their radars are transmitting.

Operations at the USAGKA airfields would not be obstructed. Existing airfield or airport arrival and departure traffic flows would also not be affected, and access to the airfield would not be curtailed. All arriving and departing aircraft and all participating military aircraft are under the control of the Bucholz Army Airfield Control Tower; thus, there would be no airfield conflicts in the region of influence, and no impact.

4.2.2.3 Post Flight Activities

Post flight activities would not affect airfield arrival and departure traffic flows. Bucholz Army Airfield Control Tower controls arriving and departing aircraft and all participating military aircraft; thus, there would be no airfield conflicts in the region of influence, and no impact.

4.2.3 Biological Resources - US Army Garrison Kwajalein Atoll

Impacts on biological resources are generally evaluated for potential losses to populations of threatened and endangered species as well as species of concern or to important habitat resources. Criteria for assessing potential impacts on marine biological resources are based on the following:

- Loss of habitat (destruction, degradation)
- Over-harvesting or excessive take (accidental or intentional death, injury)
- Harassment
- Increases in exposure or susceptibility to disease and predation
- Decrease in breeding success

4.2.3.1 Site Preparation Activities

During travel to and from Illeginni Islet, ship personnel would monitor for marine mammals and sea turtles to avoid potential ship strikes. Vessel operators would also adjust their speed based on expected animal densities, and on lighting and turbidity conditions.

The presence of motorized equipment and personnel on Illeginni Islet prior to the launch could cause individual birds to leave the western end of the islet. Depending on the nesting season for certain species, tern or other bird nests with eggs on the ground in the open areas could be damaged or covered over.

To minimize the potential for impacts to migratory birds, scare techniques such as the use of visual deterrents (e.g., scarecrows and strobe lights) would be implemented to discourage birds from nesting in the intended impact area.

The RTS and mission support personnel initiate such actions several weeks prior to the test flight activities on the islet. To prevent birds from nesting on the support equipment after initial setup, the equipment would be appropriately covered with tarps or other materials. If possible, the flight test at Illeginni would be conducted during mid-day when birds are typically at rest and less likely to be within the impact area.

4.2.3.2 Flight Activities

The terrestrial habitat of significant importance includes the seabird colonies around the islet and sea turtle nesting and haul-out areas identified along some shorelines. No direct impacts to the bird habitat located southeast of the helipad are anticipated. Birds may be temporarily startled by the noise of the test item hitting the islet, but no long-term effects are expected since the AHW FT2 HTT impact is a short-term, discrete event.

Based on post-mission observations performed immediately following a previous hypersonic technology test in 2011, no direct or indirect effects to turtles or marine mammals are expected to occur from the proposed AHW FT2 HTT flight activities. Sea turtle nesting and haul-out habitat would be avoided. Since there is a slight potential for sea turtles to haul out or nest on Illeginni Islet, as close to the time of the AHW FT2 HTT launch as safely practical, a qualified biologist would inspect the northwestern end of Illeginni Islet for sea turtles or sea turtle nests. They would report such sighting to the USAGKA Environmental Management Office, the RTS Range Directorate, and the Kwajalein Test Director at the launch facility. Sightings of sea turtles or sea turtle nests in the impact area would result in a launch delay. If personnel observe marine mammals in the area of a potential impact, such sightings would also be reported to applicable test personnel for consideration in approval of the launch.

The test article impact on Illeginni Islet, or in the shallow coral reefs, would form a crater. Information concerning the HGV energy release on impact is currently unknown. However, the impact would be less than the previous Minuteman III (MMIII) payload impacts on Illeginni. Prior MMIII tests have resulted in craters on land averaging 20 to 25 feet across and 15 feet deep, depending on the type of substrate. A reef or shallow water impact is not part of the Proposed Action, would be unintentional, and is unlikely.

On Illeginni Islet, payload impacts occur most often in cleared or maintained areas in the middle portion of the islet, thus reducing the potential for migratory bird nesting areas to be adversely affected. Should impact occur at either an area occupied by migratory seabirds and shorebirds, any of the patches of littoral forest, or on sea turtle nesting habitat along the shoreline, birds and any other wildlife close to the point of impact could be killed, bird nests or sea turtle nests might be destroyed, and small areas of nesting habitat lost. Though other birds on the islet would be startled and may flee the vicinity of the impact site, reactions are expected to be temporary, and nearby nests are not likely to be abandoned.

Such impacts do not appear to be having any long-term effects on the migratory bird populations on the islet. The 2011 post-mission survey observed generally normal behaviors and no obvious sign of external injury to Blacknaped and White Terns immediately within and adjacent to the impact area. As mentioned before, bird populations on the islet are thriving and may be increasing in numbers. The effects on sea turtle nesting sites is more difficult to predict, considering that few nest pits have been identified during surveys over the last several years.

4.2.3.3 Post Flight Activities

As with other test events, mission personnel would consult with the RMI Environmental Protection Authority (RMIEPA), USFWS, and NMFS prior to the test flight and prepare a detailed recovery/cleanup plan that outlines all post-test recovery activities and procedures for mission operations at Illeginni Islet. In all cases, the recovery and cleanup operations would be conducted in a manner to minimize further impacts on biological resources.

The proposed impact point for the payload is on the western end of Illeginni Islet. A crater would form as a result of this impact. Prior to recovery and cleanup actions at the impact site, unexploded ordnance personnel would survey the impact site before cleanup to identify any residual explosive materials. Following completion of the target damage assessment, personnel would recover all visible test article impact debris. Any craters formed by the land impact would be excavated. The excavated material would be screened for debris. Following removal of all payload items and any remaining debris from the target site, the crater would be backfilled and, if necessary, repairs made to the impact area. Accidental spills from support equipment operations would be contained and

cleaned up. All waste materials would be returned to Kwajalein Island for proper characterization and disposal.

Targeted areas for the payload would be selected to minimize impacts to protected reefs and identified wildlife habitats. Impacts to biological species on the islet would be the same as those discussed above for site preparation activities. Birds may be temporarily startled by the noise of the excavation activities, but no long-term effects are expected since the AHW FT2 HTT launch is a short-term, discrete event. No impacts to near shore sea turtles or marine mammals are anticipated as a result of nominal post flight activities.

A reef or shallow water impact is not part of the Proposed Action, would be unintentional, and is unlikely. However, if the payload inadvertently impacts in the shallow reef flats near Illeginni, the resulting crater and post-test operations could damage the coral substrate and potentially harm reef fish and various marine invertebrates protected under the UES. During at least one previous test event, post-mission observations made by LLNL personnel at Illeginni have identified damage to the coral base up to 5 feet beyond the rim of the crater.

Were this to occur, any marine life in the immediate area would be killed or injured by the force of impact and blast-like effects. This would include the loss of both protected and non-protected species of coral, and any protected mollusks (e.g., top-snail shell and giant clam species) and sponges that might have existed at or adjacent to the crater site.

The RMIEPA, USFWS, and NMFS would be invited to observe the shallow reef area as soon as the area is cleared by mission security. Visible debris would be removed following any unintentional shallow water impact.

Overall, long-term impacts to the shallow reef environment from the proposed AHW FT2 HTT impact are considered remote and insignificant. After years of reentry vehicle testing in the vicinity of Illeginni Islet, most areas of the local reef appear to be thriving with moderate to high coral cover, and abundant numbers of invertebrates and fish present.

4.2.4 Hazardous Materials and Waste - US Army Garrison Kwajalein Atoll

4.2.4.1 Site Preparation Activities

Illeginni Islet where the HGV could impact is not a part of the site preparation activities; thus, no impacts to hazardous materials and waste management would be anticipated from site preparation activities.

4.2.4.2 Flight Activities

Illeginni Islet where the HGV would impact is not a part of the flight activities site; thus, no impacts to hazardous materials and waste management would be anticipated from flight activities.

4.2.4.3 Post Flight Activities

Specific restoration actions and debris recovery, if necessary, would be determined on a case-by-case basis in coordination with the UES. At the conclusion of launch activities, Lawrence Livermore National Laboratory will be providing site remediation and will remove all debris from Illeginni Islet. Any hazardous waste remaining would be used or disposed of in accordance with the UES.

4.2.5 Health and Safety - US Army Garrison Kwajalein Atoll

4.2.5.1 Site Preparation Activities

Site preparation activities would be conducted in accordance with all applicable Federal and RMI regulations. No impacts are anticipated.

4.2.5.2 Flight Activities

RTS would provide range support for the terminal phase of flight. RTS has the unique mission of serving as the target area for a wide variety of missile launch operations from the KLC and other launch facilities. All program operations are closely coordinated to obtain approval of the USAGKA and RTS Safety Programs. This step is accomplished through presentation of the proposed program to the Safety Office. All safety analyses and other safety documentation applicable to those operations affecting the installation are provided along with an overview of mission objectives, support requirements, and schedule. The Safety Office evaluates this information and ensures that all range safety requirements (including both ground and flight safety) and supporting regulations are followed. Final responsibility and authority for the safe conduct of missile and flight test operations lies with the RTS Commander.

Range safety provides protection to installation personnel, inhabitants of the Marshall Islands, and ships and aircraft operating in areas potentially affected by missions. Specific procedures are required for the preparation and execution of missions involving aircraft, missile launches, and reentry payloads like the HGV. These procedures are based on regulations, directives, and flight safety plans for individual missions. The flight safety plans include evaluating risks to inhabitants and property near the flight path, calculating trajectory and debris areas, and specifying range clearance and notification procedures. Criteria used at RTS to determine debris hazard risks are in

accordance with RCC Standard 321-07, Common Risk Criteria Standards for National Test Ranges.

Inhabitants near the flight path, as well as air and sea traffic in caution areas designated for specific missions, are notified of potentially hazardous operations. As described earlier for PMRF/KTF, a NOTMAR and a NOTAM are transmitted to appropriate authorities to clear traffic from these caution areas and to inform the public of impending missions. The warning messages describe the time, the area affected, and safe alternate routes. The RMI Government is also informed in advance of rocket launches and reentry payload missions.

Radar and/or visual sweeps of hazard areas are accomplished immediately prior to operations to assist in the clearance of non-mission ships and aircraft. For terminal flight tests conducted within the Mid-Atoll Corridor Impact Area at RTS a number of additional precautions are taken to protect personnel and the general public. Such precautions may consist of evacuating nonessential personnel and sheltering all other personnel remaining within the Mid-Atoll Corridor.

4.2.5.3 Post Flight Activities

Post flight activities would be conducted in accordance with all applicable Federal and RMI regulations. Any hazardous material to be removed would be handled in accordance with UES requirements. No impacts are anticipated.

4.2.6 Noise - US Army Garrison Kwajalein Atoll

4.2.6.1 Site Preparation Activities

Pre-test preparation activities for either scenario (broad open area [BOA] impact or land impact), including vessel and aircraft operations, are not expected to have any noise impacts on local RMI communities. Most of the noise would occur on Illeginni Islet.

4.2.6.2 Flight Activities

Terminal flight of the AHW FT2 HTT over the RMI would create a sonic boom carpet along its flight path. Because of the vehicle's high altitude (approximately 100,000 feet), resulting sonic boom overpressures at sea level would be relatively low, ranging from about 0.12 to 0.21 psf (pounds per square foot) (109 to 114 dB [re 20 μPa] in air). As the payload nears the intended impact site, a more focused sonic boom would occur.

As the HGV nears the RTS, the vehicle would maneuver towards the pre-designated impact site at Illeginni Islet. During vehicle descent, a focused boom would occur over the islet and the atoll. Sonic boom overpressures at ocean level would range from about 0.06 psf (103 dB [re 20 μPa] in air) along the outer edges of the footprint to approximately 26 psf (156 dB [re 20 μPa] in air) near

the point of impact at Illeginni Islet. Such overpressures would be similar to those previously modeled for the HTV-2 program.

Within Kwajalein Atoll, the Kwajalein and Roi-Namur islets are the only populated islets under USAGKA management. There are also Marshallese residents located on Ennubirr Islet (just southeast of Roi-Namur Islet), Ebeye Islet, Carlos Islet (located a few miles northwest of Kwajalein Islet), and on a few other islets.

Depending on meteorological conditions, peak sound pressure levels in these areas could reach 123 dB based on a sonic boom overpressure of 0.6 psf. Although considered reasonably loud, such noise levels would be audible only once at each location, last no more than a fraction of a second, and are well within the Army standard of 140 dB (peak sound pressure level) for impulse noise. Because Carlos, Ebeye, Kwajalein, and the other populated islets are located outside the sonic boom footprint, residents at these locations may not hear the noise at all.

During vehicle descent for BOA, a focused boom would occur over a wide area of the ocean, similar to that of the AHW FT1 flight test which was also previously analyzed in the AHW Programmatic EA. Noise from the focused boom would be at the same levels as described for the land impact at Illeginni, but would occur entirely within international waters. During the flight test, RTS would verify that no non-mission vessels would be in the BOA test area. In addition, all mission support personnel and vessels would evacuate to a safe distance from the barge impact area. Depending on a vessel's location, on-board personnel may be required to wear hearing protection in compliance with the Army's Hearing Conservation Program. As a result, noise levels are not expected to have a significant impact on the human environment.

4.2.6.3 Post Flight Activities

Noise levels generated during post-test operations for either scenario (BOA or land impact) would be similar to those generated during pre-test preparations. Thus, no significant impacts to ambient noise levels are expected.

4.2.7 Cultural Resources - U.S. Army Kwajalein Atoll

4.2.7.1 Site Preparation Activities

The presence of motorized equipment and personnel on Illeginni Islet prior to the launch is not anticipated to impact the islet's cultural resources because all properties which are considered eligible for listing on the RMI National Register are located on the eastern end of the islet, outside of AHW FT2 HTT impact zones on the western end. Personnel involved in launch and other operational activities would follow UES requirements in handling or avoiding any cultural resources uncovered during test activities.

4.2.7.2 Flight Activities

Buildings and other facilities at Illeginni are primarily in the central and eastern portions of the islet. All of the known cultural sites on Illeginni are on the eastern end of the islet. No impacts are anticipated from a nominal launch. Personnel involved in launch and other operational activities would follow UES requirements in handling or avoiding any cultural resources uncovered during operational or monitoring activities.

4.2.7.3 Post Flight Activities

Post flight clean-up and evacuation procedures would be handled so as to avoid removal, destruction, or damage to cultural resources. Any craters that occur as a result of the AHW FT2 HTT impact would be filled using material on the islet. Personnel involved in launch and other operational activities would follow UES requirements in handling or avoiding any cultural resources uncovered during AHW FT2 HTT demonstration activities.

4.2.8 Water Resources - US Army Garrison Kwajalein Atoll

No significant groundwater or surface water resources exist on Illeginni Islet; no impacts are considered plausible.

4.3 BROAD OCEAN AREA

4.3.1 Air Quality - Broad Ocean Area

4.3.1.1 Site Preparation Activities

No site preparation activities would occur for the Broad Ocean impact alternative that would impact air quality.

4.3.1.2 Flight Activities

Stratospheric Ozone Layer

Exhaust emissions from the rocket motors contain both chlorine compounds and free chlorine, produced primarily as hydrogen chloride at the nozzle. A typical Strategic Target System launch would release approximately 1.9 tons of hydrogen chloride (see **Error! Reference source not found.**). The chlorine and hydrogen chloride would have a long enough tropospheric lifetime to mix eventually with the stratosphere, even when released at ground level. The global release of emissions from rocket launches, however, is small enough that it is not listed as a significant source of ozone depleting gases by the World Meteorological Organization (World Meteorological Organization, 2006). It is also estimated that the emission loads of chlorine (as hydrogen chloride

and chlorine gas) from rocket launches worldwide, as projected from 2004 to 2014, would account for only 0.5 percent of the industrial chlorine load from the United States over the 10-year period.

Both aluminum oxide (Al_2O_3) and nitrogen oxides (NOx) are also of concern with respect to stratospheric ozone depletion. The launch would release approximately 5.6 tons of Al_2O_3 and 1.9 tons of NOx (**Error! Reference source not found.**). The aluminum oxide is emitted as solid particles and can activate chlorine in the atmosphere. The exact magnitude of ozone depletion that can result from a buildup of Al_2O_3 over time has not yet been determined quantitatively, but is considered insignificant based on existing analyses. Following the launch, the majority of this compound would be removed from the stratosphere through dry deposition and precipitation.

NOx, like certain chlorine compounds, also contributes to catalytic gas phase ozone depletion. The production of NOx species from solid rocket motors is dominated by high-temperature "afterburning" reactions in the exhaust plume. As the temperature of the exhaust decreases with increasing altitude, less NOx is formed. Because diffusion and winds would disperse the NOx species generated, no significant effect on ozone levels is expected.

In summary, rocket emissions from the Proposed Action would not have a significant impact on stratospheric ozone depletion; however, any emission of ozone-depleting gases represents a minute increase that could have incremental effects on the global atmosphere.

Greenhouse Gases and Global Warming

Carbon dioxide is the only GHG identified in the Kyoto Protocol that would be emitted during launch of the Strategic Target System rocket. Because of the solid propellant used, the launch would release about 0.4 tons of CO_2. This does not include a small number of support ocean vessels, aircraft, and other equipment that would be used at USAGKA and around the Marshall Islands to support the terminal phase preparations and operations. Although the full extent of their use has not yet been determined, it is expected to be limited and temporary. In addition, the availability of GHG emission factors for vessels and some aircraft is limited. For these reasons, GHG emissions from such sources were not quantified in this analysis. The amount of emissions that would be released, however, is considered to be negligible.

In addition, the CEQ recently released draft guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA analyses. The draft guidance includes a presumptive effects threshold of 27,563 tons of CO_2 equivalent emissions from a proposed action on an annual basis. The GHG emissions associated with the Proposed Action fall well below the Council on Environmental Quality threshold. Although this limited amount of emissions would not contribute significantly to global warming, any emission of GHG represents a minute increase that could have incremental effects on the global atmosphere.

4.3.1.3 Post-Flight Activities

No post flight activities would occur for the Broad Ocean impact alternative that would impact air quality

4.3.2 Biological Resources - Broad Ocean Area

No substantial impacts to the BOA and its wildlife have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative impacts. Although one alternative considers the AHW FT2 HTT demonstration impact may take place in the broad, this is a discrete, short-term event and no adverse cumulative impacts are anticipated.

4.3.3 Water Resources - Broad Ocean Area

Pre-flight activities are not within the water resources region of influence for the broad ocean impact alternative.

4.3.3.1 Flight and Post Flight Activities

The possibility of water pollution is associated primarily with toxic materials, which may be released to and are soluble in the water environment. Rocket propellants are the dominant source of such materials, although consideration must be given also to soluble materials originating from hardware and miscellaneous materials and to certain toxic combustion products. Solid propellants can contain polymer compounds such as polyvinylchloride, polyurethane, polybutadiene, polysulfide, and others, mixed with ammonium perchlorate. The plastics and rubbers are generally considered nontoxic and, in the water, would be expected to decompose and disperse at a very slow rate. No substantial effects on seawater quality due to solid fuel emissions, solid fuel debris, or missile debris are expected. In the event that not all of the solid propellant is burned, the hard rubber-like solid fuel would dissolve slowly. The small amount of any potential toxic materials would be rapidly dispersed to nontoxic levels by ocean currents.

The activities associated with the Proposed Action would not introduce new types of expended materials or debris in the BOA.

4.4 CUMULATIVE IMPACTS

Airspace - US Army Garrison Kwajalein Atoll

The Proposed Action would not occur at the same time as other regional programs such as Minuteman III or anti-ballistic missile testing. No other projects in the region of influence have been identified that would have the potential for cumulative impacts to airspace. The use of the

required scheduling and coordination process for international airspace, and adherence to applicable DoD directives and US Army regulations concerning issuance of NOTAMs and selection of missile firing areas and trajectories, lessens the potential for significant incremental, additive, cumulative impacts.

Biological Resources - US Army Garrison Kwajalein Atoll

The AHW FT2 HTT demonstration mission would be a short-term, discrete event. The Proposed Action would not occur at the same time as other regional programs such as Minuteman III or anti-ballistic missile testing activities. No other projects in the region of influence have been identified that would have the potential for cumulative impacts to biological resources. No significant cumulative impacts to biological resources have been identified as a result of prior or current activities in the region of influence.

As a reference point of comparison, the Conventional Strike Missile EA evaluated the consequences of weapon projectiles and re-entry vehicle impacts, plus personnel and motorized vehicles present on Illeginni Islet for several weeks in support of the Conventional Strike Missile, Hypersonic Glide Vehicle, and Minuteman III Modification flight tests. This assessment concluded the concurrent combination of these flight tests could possibly result in potential cumulative impacts for migratory birds on Illeginni Islet because of pre- and post-test activities, acoustic overpressures, and test vehicle/debris impacts.

The implementation of actions to discourage nesting, however, would minimize impacts on birds. Although potential impacts to sea turtle nesting sites is possible, the lack of recorded nests on the islet, in addition to precautions to locate turtle nests prior to each test, minimize the potential for cumulative impacts to occur.

Biological Resources - Broad Ocean Area

The preferred alternative AHW FT2 HTT demonstration is not expected to result in potential cumulative impacts for marine mammals. While acoustical impacts on marine mammals are possible, minimal offshore areas would be affected, and pretest surveys prior to each test would reduce the risk for cumulative impacts.

Cultural Resources - U.S. Army Kwajalein Atoll

All of the sites on Illeginni have been classified as insignificant under the RMI Land Modification Regulations. No impacts are anticipated from the proposed AHW FT2 HTT demonstration.

Hazardous Materials and Waste – Kodiak Launch Complex

Hazardous materials used and waste generated as a result of the AHW FT2 HTT demonstration activities would not exceed the existing hazardous waste permit conditions on PMRF. The Proposed Action would not use or produce substantial amounts of hazardous materials or hazardous waste at KTF. Solid propellants used with the Strategic Target System will be self-contained and not pose a risk of spill. The types of hazardous materials used and waste generated would be similar to those previously used and generated at KLC. Fuel handling and replenishment for mobile generators would result in a minor potential impact. All hazardous waste would be disposed of in accordance with the KLC Hazardous Waste Management Plan.

Hazardous Materials and Waste – U.S. Army Kwajalein Atoll

Adherence to the hazardous materials and waste management systems of USAGKA would preclude improper accumulation of hazardous materials or waste. If there were hazardous waste incidents, the mission personnel would comply with the emergency procedures set out in the KEEP and the UES. The AHW FT2 HTT demonstration is not expected to result in cumulative hazardous materials and hazardous waste impacts at USAGKA. No other activities in the region of influence have been identified that would have the potential for incremental, additive cumulative impacts to existing hazardous materials and waste management practices.

Health and Safety – Kodiak Launch Complex

To protect people from injury from either nominal launches or accidents, two primary mitigation measures are in place: flight termination and clearance of specified regions. Clearance areas include the ground hazard area for land areas, Exclusion Zones for ocean areas, and Restricted Airspace and ALTRVs for airspace. The ground hazard area for the Strategic Target System vehicle is modified 10,000 feet from the launch location. Clearance of this region ensures that the public is excluded from any area that will be at risk from an errant missile in the time immediately after launch before the Missile Flight Safety Officer could react to the malfunction (i.e., several seconds). No other projects in the region of influence have been identified that would have the potential for incremental, additive cumulative impacts to health and safety.

Health and Safety - U.S. Army Kwajalein Atoll

The USAGKA and RTS are restricted access areas dedicated to military research, test, and training activities. Safety standards are high at USAGKA and serve to keep any cumulative safety impacts attributable to all mission operations within acceptable standards to both workers and the public. The Proposed Action activities would not occur at the same time as other regional programs such as Minuteman III or anti-ballistic missile testing activities. No other projects in the region of

influence have been identified that would have the potential for incremental, additive cumulative impacts to health and safety.

Noise – Kodiak Launch Complex

Proposed actions related to the AHW FT2 HTT demonstration will have a noise impact that is expected to be almost identical to the previous STARS booster vehicle launches performed at this facility. The greatest noise energy is experienced shortly after lift-off within the thrust cone of the rocket and reduces exponentially as the vehicle gains altitude. The previous launches demonstrate no cumulative noise effects anticipated from the proposed action.

Noise – US Army Garrison Kwajalein Atoll

During the re-entry phase of the flight test, a sonic boom is expected to radiate from HGV along the flight path in the immediate vicinity of the impact target. Based on the orientation of the proposed flight path, residents of the inhabited islands on Kwajalein Atoll might not even experience any sound from the test. The cumulative noise effects are considered unlikely from this test event.

Water Resources -Kodiak Launch Complex

The amount of exhaust products from the rocket that could potentially be deposited due to the Proposed Action would be small and no cumulative impacts are expected. Rocket hardware, debris, and propellants that could fall into the ocean are expected to have only a localized, short-term effect on water quality. No cumulative impacts to water resources are anticipated.

4.5 SUMMARY OF ENVIRONMENTAL MANAGEMENT AND MONITORING ACTIONS

Throughout this EA, various environmental management controls and monitoring systems are described. These measures are required by Federal, State, DoD, and agency-specific environmental and safety regulations, and are usually implemented through normal operating procedures.

Although no significant or other major impacts are expected to result from implementation of the Proposed Action, some specific environmental management and monitoring actions have been identified to minimize the level of impacts that might occur at the KLC and Illeginni. These are summarized below:

1. At Illeginni Islet, should any debris impact in areas of sensitive biological resources (i.e., forested areas, sea turtle nesting habitat, and coral reef), then RMIEPA, USFWS, and NMFS biologists would provide guidance and/or assistance in recovery operations to minimize impacts on such resources. In all cases, hand tools would most likely be used.

2. The mission sponsor will initiate pre-test monitoring by qualified biologists, such as inspecting beach areas for active sea turtle nests at Illeginni Islet, within 30 days of the scheduled test. If active nests are discovered, monitors will immediately notify the USAGKA and NMFS and implement recommendations to avoid or minimize project-related impacts to sea turtle nests.
3. Prior to the AHW FT2 HTT demonstration, mission support staff will inspect sea turtle nesting habitat to ensure that no sea turtles are hauled out or active nests present that could be affected by the HGV impact.
4. Within approximately one day after the test at Illeginni Islet, qualified terrestrial and marine biologists will survey the islet and the near-shore waters for inadvertent impacts on reef or shallow water. In addition, RMIEPA, UES Agency, and Installation biologists would assist in recovery and rehabilitation of any injured migratory birds or sea turtles found at Illeginni. During inspections of the islet, biologists would assess any test-related sea turtle mortality.
5. During marine travel to and from Illeginni and test support areas, ship personnel would monitor for marine mammals and sea turtles to avoid potential ship strikes. Vessel operators would also adjust their speed based on expected animal densities, and on lighting and turbidity conditions.
6. For the Preferred Alternative at Illeginni Islet, mission personnel would conduct aerial over flight of the islet and vicinity within several hours after the test to survey for any dead or injured marine mammals and sea turtles.
7. Vessel operations would not involve any intentional ocean discharges of fuel, toxic wastes, or plastics and other solid wastes that could potentially harm marine life.
8. Following the AHW FT2 HTT demonstration, during recovery of free-floating sensors in the BOA, sightings of any dead or injured marine mammals or sea turtles would be reported to the USAGKA Environmental Management Office, which would then inform UES Agencies in accordance with the UES. Aircraft pilots operating in the vicinity of the impact and test support areas near Illeginni Islet would also report any sightings of dead or injured mammals. If an accidental take were to occur as a result of an ocean impact, the Installation, USASMDC/ARSTRAT, RMIEPA, and the UES Agencies would formulate an action plan integration into future flight test planning to reduce the risk of accidental takes.
9. If any AHW FT2 HTT vehicle debris is found during vessel operations to remove free floating sensors from the BOA, then the debris would be collected for proper disposal.

4.6 NO ACTION ALTERNATIVE

Under the No-action Alternative, the AHW FT2 HTT mission would not be implemented at the KLC, Illeginni, or anywhere else in the Marshall Islands. Thus, there would be no technology testing, and no related environmental impacts from launch activities or terminal flight operations. The KLC and USAGKA installation would continue ongoing operations and environmental conditions are not expected to change from those described in Section 1.0 of the EA.

4.7 FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS

Based on the model launch trajectory of the proposed HHT mission, the protection provided by range safety regulations and procedures, and the occurrence of launch noise over a wide area, there would be no disproportionate impacts to minority populations and low-income populations under Executive Order 12898. The Executive Order states that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." In addition, the Executive Order requires that minority and low-income populations be given access to information and opportunities to provide input to decision-making on Federal actions. This Environmental Assessment and draft Finding of No Significant Impact are available for public review and comment via the internet, and at several publicly available, local document repositories.

Proposed activities would be conducted in a manner that would not substantially affect human health and the environment. Access to the waters adjacent to the KLC for fishing is generally allowed, but some of these areas would be restricted during hazardous activities. Other areas along the coast currently open to the public would be available for subsistence and recreational use, subject to the safety restrictions previously described. As a routine practice, advance notification is provided of closure times, so minimal impacts on subsistence fishing are expected. This EA has identified no effects that would result in disproportionately high or adverse effect on minority or low-income populations in the area. The activities would also be conducted in a manner that would not exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination because of their race, color, national origin, or socioeconomic status.

4.8 FEDERAL ACTIONS TO ADDRESS PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS

This Environmental Assessment has not identified any environmental health and safety risks that may disproportionately affect children, in compliance with Executive Order 13045, as amended by Executive Order 13229.

5.0 REFERENCES

(Preliminary Draft) Kodiak Launch Complex Launch Pad Environmental Assessment, 2013

Environmental Standards and Procedures for United States Army Kwajalein Atoll (USAGKA) Activities in the Republic of the Marshall Islands, 12th Edition, 2012

USFWS Advanced Hypersonic Weapons Demonstration Test Trip Report, 2011

Advanced Hypersonic Weapon Program Environmental Assessment, 2010

Environmental Assessment for Conventional Strike Missile Demonstration, 2010

Pacific Missile Range Facility Intercept Test Support, Environmental Assessment/Overseas Environmental Assessment, 2010

Environmental Assessment for Hypersonic Technology Vehicle 2 Flight Tests, 2009

Hawaii Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement, 2008

Environmental Monitoring Report FTG-02 Launch, Kodiak Launch Complex, 2006

Environmental Assessment for Minuteman III Modification, 2004

Ground-Based Midcourse Extended Test Range Environmental Impact Statement, 2003

North Pacific Targets Program Environmental Assessment, 2001

Endangered Species and Wildlife Resources Inventory at US Army Kwajalein Atoll, US Fish and Wildlife Service and National Marine Fisheries Service, March 2001.

Kodiak Launch Complex Environmental Assessment, 1996

US Army Kwajalein Atoll (USAGKA) Supplemental Environmental Impact Statement, 1993

Strategic Target System Environmental Assessment, 1992

Strategic Target System Environmental Impact Statement, 1992

Environmental Assessment for Department of Energy (DOE) Reentry Vehicles, Flight Test Program, US Army Kwajalein Atoll, Republic of the Marshall Islands, 1992

Environmental Assessment Missile Impacts, Illeginni Island at the Kwajalein Missile Range, Kwajalein Atoll Trust Territory of the Pacific Islands, 1977

R&M Consultants, et al. 2008. Environmental Monitoring Report FTX-03 Launch. Report for Alaska Aerospace Development Corporation. Anchorage, Alaska.

R&M Consultants, et al. 2007. Environmental Monitoring Report FTG-03a Launch. Report for Alaska Aerospace Development Corporation. Anchorage, Alaska.

R&M Consultants, et al. 2006. Environmental Monitoring Report FTG-02 Launch. Report for Alaska Aerospace Development Corporation. Anchorage, Alaska.

University of Alaska Anchorage, Environment and Natural Resources Institute. 2005. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, February 2005 STARS IFT 14 Launch. Final report. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

University of Alaska Anchorage, Environment and Natural Resources Institute. 2005. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, December 2004 STARS IFT 13C *Launch.* Final report. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

University of Alaska Anchorage, Environment and Natural Resources Institute 2002a. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, September 2001 Athena Launch. Final report. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

University of Alaska Anchorage, Environment and Natural Resources Institute 2002b. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, November 2001 STARS Launch. Final report. Anchorage, AK. Report for Alaska Aerospace Development Corporation. 1 vol.

University of Alaska Anchorage, Environment and Natural Resources Institute 2002c. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, April 2002 QRLV-2 Launch. Final report. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

University of Alaska Anchorage, Environment and Natural Resources Institute 2002d. Summary Findings of Environmental Monitoring Studies for the Kodiak Launch Complex 1998-2001. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

University of Alaska Anchorage, Environment and Natural Resources Institute 2001. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, March 2001 QRLV Launch. Final report. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

University of Alaska Anchorage, Environment and Natural Resources Institute 2000. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, September 1999 ait-2 Launch. Final report. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

University of Alaska Anchorage, Environment and Natural Resources Institute 1999. Kodiak Launch Complex, Alaska, Environmental Monitoring Studies, November 1998 ait-1 Launch. Anchorage, AK. Report for Alaska Aerospace Development Corporation.

6.0 LIST OF PREPARERS

Government Preparers

David Hasley, Environmental Engineer, US Army Space and Missile Defense Command
B.S., 1984, Mechanical Engineering, University of Texas, Arlington, TX
Years of Experience: 26

Mark Hubbs, Environmental Protection Specialist/Archaeologist, US Army Space and Missile Defense Command
M.A., Archaeology and Heritage, University of Leicester, UK
M.S., Environmental Management, Stamford University, Homewood, AL
B.A., History, Henderson State University, Arkadelphia, AR
Years of Experience: 20

Contractor Preparers

Norman Straub, Project Manager, WHPacific, Inc.
B.S., 1990, Chemistry, Slippery Rock University, PA
Years of Experience: 23

Catherine Shuman, Project Manager, WHPacific, Inc.
B.S., Geology, Weber State College, Ogden, UT
A.A.S., Chemistry, Weber State College, Ogden, UT
Years of Experience: 25

Holly Graham, Senior Environmental Scientist, WHPacific, Inc.
B.S., 1987, Geology, University of Oregon, Eugene, OR
Years of Experience: 20

Melissa Becker, Senior Environmental Scientist, WHPacific, Inc.
M.S., 2013, Environmental Science, Alaska Pacific University, Anchorage, AK
B.S, 2000, Environmental Science, Central Washington University, Ellensburg, WA
B.A., 2000, Environmental Studies, Central Washington University, Ellensburg, WA
Years of Experience: 13

Casey Storey, Senior Environmental Scientist, WHPacific, Inc.
M.B.A., Sustainable Business, Marylhurst University, Marylhurst, OR
M.S., Conservation Ecology and Sustainable Development, University of Georgia, Athens, GA
B.S., 2009, Environmental Studies, Prescott College, Prescott, AZ
Years of Experience: 11

Darla White, Environmental Scientist, WHPacific, Inc.
M.S., 2010, Tropical Biology and Environmental Science, University of Hawai'i, Hilo, HI
B.S., 2003, Marine Science, University of Hawai'i, Hilo, HI
Years of Experience: 10

Contractor Preparers (continued)

Elizabeth Lanej, Environmental Scientist, WHPacific, Inc.
B.S., 2001, Biology, Warner Pacific College, Portland, OR
Years of Experience: 6

APPENDIX A DISTRIBUTION LIST

This page intentionally blank.

UES APPROPRIATE AGENCY CONTACT LIST

AGENCY	CONTACT	PHONE/ FAX	ADDRESS AND EMAIL
Republic of the Marshall Islands Environmental Protection Authority	Mr. Lowell Alik Deputy General Manager		Republic of the Marshall Islands Environmental Protection Authority PO Box 1322 Majuro, MH 96960-1322
Republic of the Marshall Islands Secretary of Interior and Outer Island Affairs	Josepha A. Maddison Deputy Historic Preservation Officer		Republic of the Marshall Islands Secretary of Interior and Outer Island Affairs Majuro Atoll, MH 96960
U.S. Environmental Protection Agency, Region IX Pacific Islands Office	W. Norwood Scott		U.S. Environmental Protection Agency, Region IX Pacific Islands Office 75 Hawthorne Street (CED-6) San Francisco, CA 94105
U.S. Army Corps of Engineers, Honolulu District	CEPOH-PP-E (H. Takemoto)		U.S. Army Engineer District, Honolulu ATTN: CEPOH-PP-E (H. Takemoto) Building 252 Fort Shafter, HI 96858-5440
National Marine Fisheries Service/Pacific Island Regional Office Habitat Conservation Division	Steven Kolinski, Ph.D.		National Marine Fisheries Service/Pacific Island Regional Office Habitat Conservation Division 1601 Kapiolani Boulevard, Suite 1110 Honolulu, HI 96814-4700
U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife Office	Loyal Mehrhoff, Ph.D.		U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife Office PO Box 50088 Honolulu, HI 96850
U.S. Army Garrison Kwajalein Atoll	SMDC-RDTC-TEK-W (Derek Miller)		U.S. Army Garrison Kwajalein Atoll ATTN: SMDC-RDTC-TEK-W (D. Miller) PO Box 903 APO, AP 96555-0010

(ALASKA) FEDERAL AGENCY CONTACT LIST

AGENCY	CONTACT	PHONE/ FAX	ADDRESS AND EMAIL
US Coast Guard 17th District	Rear Admiral Thomas P. Ostebo, District Commander		US Coast Guard 17th District PO Box 25517 Juneau, AK 99802
USEPA Region 10, Alaska Operations Office	Jennifer Curtis, Environmental Review		USEPA Region 10, Alaska Operations Office 605 W 4th Avenue, M/S AOO/A Anchorage, Alaska 99501
US Fish and Wildlife Service, Alaska Region	Anne Rappaport, Alaska Field Office Manager		US Fish and Wildlife Service, Alaska Region 605 W 4th Avenue, Room G-61 Anchorage, Alaska 99501
US Fish and Wildlife Service Alaska Maritime National Wildlife Refuge			US Fish and Wildlife Service Alaska Maritime National Wildlife Refuge 95 Sterling Highway, Suite 1 Homer, Alaska 99603
US Fish and Wildlife Service Kodiak Island National Wildlife Refuge			US Fish and Wildlife Service Kodiak Island National Wildlife Refuge 1390 Buskin Rd Kodiak, Alaska 99615
NOAA Fisheries National Marine Fisheries Service			NOAA Fisheries National Marine Fisheries Service PO Box 21668 709 W. 9th St., Rm 420 (UPS/Fed Ex. Only) Juneau, Alaska 99802

(ALASKA) STATE / LOCAL AGENCY CONTACT LIST

AGENCY	CONTACT	PHONE/ FAX	ADDRESS AND EMAIL
Alaska Department of Environmental Conservation	Larry Hartig Commissioner		Alaska Department of Environmental Conservation PO Box 111800 410 Willoughby Ave., Ste. 303 Juneau, AK 99801-1795
Alaska Department of Fish and Game	Cora Campbell Commissioner		Alaska Department of Fish and Game PO Box 25526 1255 W 8th Street Juneau, AK 99811-5526
Alaska Department of Natural Resources	Joe Balash Commissioner		Alaska Department of Natural Resources 400 Willoughby Ave, 5th Floor Juneau, AK 99801
Alaska Department of Transportation and Public Facilities	Patrick J. Kemp, P.E Commissioner		Alaska Department of Transportation and Public Facilities PO Box 112500 3132 Channel Drive, #300 Juneau, AK 99801-7898
City of Kodiak	Aimée Kniaziowski City Manager		City of Kodiak 710 Mill Bay Road Kodiak, Alaska 99615
Kodiak Island Borough	Bud Cassidy Borough Manager		Kodiak Island Borough 710 Mill Bay Rd. Kodiak, AK 9961
Alaska Aerospace Corporation	Craig Campbell President and CEO		Alaska Aerospace Corporation 4300 B Street, Suite 101 Anchorage, AK 99503

ALASKA TRIBAL CONTACT LIST

AGENCY	CONTACT	PHONE/ FAX	ADDRESS AND EMAIL
Pauloff Harbor Village	William Dushkin ,Sr. President Lisa Jackson Environmental Coord.	383-6075 phone; 383-6094 fax	P.O. Box 97 Sand Point, AK 99661 phttec@arctic.net pauloff@arctic.net
Qagan Tayagungin Tribe of Sand Point Village	David O. Osterback President Karis Porcincula Environmental Coord.	383-6968 phone; 383-5814 fax	P.O. Box 447 Sand Point, AK 99661 environmental2005@yahoo.com qttenvironmental@arctic.net
Native Village of Unga Unga Tribal Council	John A. Foster President	383-2415 phone; 383-5553 fax	P.O. Box 508 508 Red Cove Rd Sand Point, AK 99661 ungacorp@arctic.net Thompsonsdp@aol.com
Native Village of Akhiok	Speridon Simeonoff President	836-2313 phone; 836-2345 fax	P.O. Box 5030 Akhiok, AK 99615 sandra.zeeder@kanaweb.org
Kaguyak Tribal Council Kaguyak Village	Phyllis Amodo President	836-2231 phone; 836-2232 fax	P.O. Box 5078 Akhiok, AK 99615
Village of Old Harbor	Conrad Peterson President	286-2215 phone; 286-2277 fax	P.O. Box 62 Old Harbor, AK 99643 ohtcigap@yahoo.com
Sun'aq Tribe of Kodiak	Brenda Schwantes Tribal Chairperson	486-4449 phone; 486-3361 fax	312 West Marine Way Kodiak, AK 99615 sunaq_enviro@gci.net

APPENDIX B CORRESPONDENCE

This page intentionally blank.